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ABSTRACT

This two-part document reports the results of a literature review of workplace literacy program evaluation and then details a study of two current workplace literacy programs. The five chapters of the first part summarize findings on what is known about workplace literacy programs, methods for evaluating workplace literacy programs, assessing workplace literacy program results, assessing the impact on family literacy, and assessing the impact on productivity. The second part describes the study, the purposes of which were to develop an impact assessment model for workplace literacy programs and to produce data on the impact of programs at two sites, as well as to refine the model for use at other sites. The two sites chosen were very different but both operate established programs involving technical and communications training, high school equivalency programs, and English-as-a-Second-Language classes. Pre- and post-program data were gathered on learners' job productivity, literacy attributes, and literacy practices with their families through interviews, tests, and questionnaires, and supervisor ratings. Results showed that learners made gains in their literacy self-image, their ability to articulate plans, the amount and range of literacy activity both at work and away from work, and their reading strategies and comprehension. The study concluded that the evaluation process developed can be used as a model for evaluation of workplace evaluation projects. Eight appendices contain project forms, and a bibliography lists 79 references. (KC)

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EVALUATING THE IMPACT OF WORKPLACE LITERACY PROGRAMS

Results and Instruments from the NCAL Workplace Literacy Impact Project

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CONTENTS

Acknowledgements		iii
Contents		v
PART I	**RESEARCH BACKGROUND ON WORKPLACE LITERACY**	
Chapter 1	What we know about workplace literacy programs	3
Chapter 2	Methods for evaluating workplace literacy programs	15
Chapter 3	Assessing workplace literacy program results	25
Chapter 4	Assessing impact on family literacy	39
Chapter 5	Assessing impact on productivity	47
PART II	**THE CURRENT STUDY**	
Chapter 6	Structure of current study	61
Chapter 7	Results of current study	75
Chapter 8	Discussion and implications	93
Bibliography		109
Appendix A	Interview form and instructions	117
Appendix B	Questionnaire form and instructions	133
Appendix C	Cloze test samples and instructions	143
Appendix D	Family literacy focus group interview	151
Appendix E	Classroom observation form	157
Appendix F	ESL checklist	161
Appendix G	Supervisor rating scale examples and instructions	167
Appendix H	Tabular data	175

Part I

RESEARCH BACKGROUND ON WORKPLACE LITERACY

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CHAPTER 1

What We Know About Workplace Literacy Programs

OVERVIEW

Though a growing body of research has identified principles and elements associated with effective workplace literacy programs, few programs are able to incorporate all elements. Evaluation of workplace literacy programs is further complicated by the fact that there appear to be a variety of workplace literacy problems, each calling for a different sort of instruction. Still, over the last two decades, we have learned a good deal about what to look for in effective workplace literacy programs.

For example we have learned that:

- there are several different workplace literacy problems which call for a multi-stranded approach to instruction;
- improvement takes a significant amount of learner practice time;
- transfer from learning one application to new applications is very limited;
- significant learning loss occurs within a few weeks if skills are not practiced.

We have also learned that effective workplace literacy programs are characterized by active involvement of project partners (including employees) in systematically determining local literacy needs and developing programs.

MULTIPLE STRANDS FOR MULTIPLE PROBLEMS

It is important to realize that we face several literacy problems in the workplace and not just one. The person who can't read at all requires different support than does the high school graduate who

can't meet the new reading demands of his job. People educated in a foreign language and not speaking much English require another sort of support. Providing the same services and programs to such different clients makes no sense, and yet it sometimes occurs.

Increasingly, programs in business and industry are becoming multi-strand programs. In such programs, one instructional strand might be available to English as Second Language learners while other strands are available for learners wishing to pursue GED certificates in preparation for further education or for high school graduates preparing for technical training. Even the format for instruction may vary from structured classes to small group instruction to computer guided learning, to individual tutoring.

Bussert (1991) surveyed 107 workplace literacy programs described in the research literature. Of the descriptions of workplace literacy programs providing sufficient information for judgments to be made, the vast majority (74%) offered a multiple strand curriculum (i.e. two or more of the following: ABE, GED, ESL, a selection of basic skills/technical courses) while 13% reported self-pacing of learning (i.e. home study, PLATO computerized learning, learning modules).

IMPROVEMENT TAKES SIGNIFICANT LEARNER PRACTICE TIME

Training material and technical reading material in the workplace tends to range in difficulty from upper high school to beginning college difficulty levels (Sticht, 1975; Mikulecky, 1982; Rush, Moe & Storlie, 1986). Some learners, like high school graduates who need to brush-up reading skills, can learn to comprehend technical materials with a minimum of instruction time (about 30-50 hours). Other learners who have extreme difficulty with even simple reading, such as signs or simple sentences, may require several hundred hours of instruction or, indeed, may never be able to comprehend some technical material. Gains do not come quickly. The average program takes approximately 100-120 hours of practice time for learners to make the equivalent of a year gain in reading

ability. Auspos et al (1989) reports that several hundred learners in a pre-work literacy program in 13 diverse sites across the country averaged 132 hours of basic education. Of the participants tested for reading gains using the Test of Adult Basic Education, an average .7 of a year gain in reading ability after approximately 100 hours of instruction was demonstrated.

Targeted programs using materials which learners encounter during everyday activities appear to make more rapid gains, but still take from 50-60 hours per grade level gain (Mikulecky, 1989). Sticht (1982) reports that military enlisted men receiving 120 hours of general reading instruction averaged an improvement of .7 grade levels in reading ability. Enlisted men being trained with workplace materials improved 2.1 grade levels *when reading work related materials* during the same amount of time.

Computer learning programs may also cut learning time slightly, probably since there is more reading practice and less discussion. Haigler (1990) indicates that learners gained an average of 1.26 years of reading ability in an average of 78 hours of practice using computerized lessons in the JSEP job related basic skills program. This is equivalent to about 63 hours of practice for a year of gain.

Yet, linking learning gain to practice time can be somewhat deceptive and misleading. A sense of perspective is needed. A gain of one year of reading growth in one hundred twenty hours of practice is a bargain compared to the experience of the average school child who spends over a thousand hours for a reading gain of one year. Furthermore, the more effective workplace literacy programs report reducing learning time to 50-70 hours of practice for a year of gain. *No program, however, has been able to consistently improve reading ability from low-level to high school or college standards in 20, 30 or even 50 hours.* This is important to note because in many industries the standard training class is less than thirty hours.

The fact that literacy gains usually take more time than is typically allocated in workplace training programs presents a problem.

For gains to occur, more practice time must be found. Effective programs demonstrate at least three possibilities for increasing practice time. Some programs immerse employees in integrated technical/basic skills classes full-time for several weeks (see Delco description in Chapter 6). Other programs provide sequences of courses allowing learners to move from one course to another and eventually to continue learning at technical schools and community colleges. A third program type uses workplace materials in training classes, and thus reaps the bonus of additional practice time as learners read these same materials on the job.

TRANSFER TO NEW APPLICATIONS IS SEVERELY LIMITED

Research indicates that there is a severe limitation on how much literacy will transfer from one type of task to other types of tasks, if the new tasks are not part of the training. Reading the Bible is considerably different from reading the newspaper which, in turn, differs significantly from the sort of thinking one does while reading a manual. Perkins and Salomon (1989:19), after reviewing the cognitive research from the late '70's through the '80's concluded that:

> "To the extent that transfer does take place, it is highly specific and must be cued, primed, and guided; it seldom occurs spontaneously. The case for generalizable, context-independent skills and strategies that can be trained in one context and transferred to other domains has proven to be more a matter of wishful thinking than hard empirical evidence."

Consistently during the past decade, literacy researchers have reminded us that literacy is not something you either do or do not have. It is not even a continuum. *What we mean by "literacy" is more accurately described as "literacies."* There is some degree of overlap between being able to read one sort of material and being able to read other sorts. The degree of overlap between reading a short story, a poem, a lab manual, an equation, a computer screen, a census report, and government documents may be severely limited, however. We know very little about the degree of overlap and the degree of

difference among these various literacy formats and tasks.

Evidence suggesting the limitations of transferring literacy skills is found in the results from the National Assessment of Educational Progress, which surveyed the literacy skills of young adults (Kirsch & Jungeblutt, 1986). This survey measured the literacy abilities of young adults in three different areas: their use of prose, document, and quantitative forms of literacy. Correlations among subject performances in these three areas revealed limited overlap in literacy abilities (i.e. about 25% shared variance). Among those surveyed, being able to read a newspaper was only partially related to being able to make sense of a document like a chart, table, or form. Some literacy ability apparently will transfer. Document reading and prose reading, for example, did not seem to be totally separated skills. *For most learners, however, this degree of shared literacy ability appears to be insufficient for transfer to occur easily.* The idea of teaching someone to read a poem and expecting that s/he is going to improve also in ability to read a computer screen is probably a misplaced hope. What we want people to be able to do, we need to teach them. Some people are able to make great transfers from one situation to others. Such people, unfortunately, do not appear to be the norm.

The limitations of literacy transfer have serious implications for workplace literacy programs. This is especially true if programs attempt to use traditional, school-type materials. Sticht (1982) found that general literacy training did not transfer to job applications. He now recommends a "functional context" approach which teaches literacy by using the materials with which one is likely to function on a daily basis.

Significant Learning Loss Occurs Without Regular Practice

The problem of lack of transfer is related to the problem of learning loss. When a person cannot use what they have learned in real-world situations, they tend to lose the new skill because they lose the chance to practice it. This is important, because new knowledge

must be used or it is lost. Sticht's (1982) report of military studies indicates that enlisted men improved in literacy abilities while they were in general literacy classes, but that within eight weeks, 80% of those gains were lost. The only exception to this finding occurred when job-related materials were used to teach literacy abilities. In the latter case, learning gains held up, probably because learners were able to see transfer and continued to practice the abilities they had mastered.

This finding is very important. It means that efforts and resources can be squandered if learners are taught with general materials which have no relationship to the materials they see daily. It also suggests that the timing of workplace literacy training is important. Preparing learners for the basic skills which are demanded by new jobs may be wasted if learners must wait several months before they are able to apply and practice their new learning.

Some programs (Mikulecky & Philippi, 1990) have analyzed specific job tasks and developed instructional materials using both work and everyday materials. For example, in banking, the careful reading of withdrawal and deposit slips involves reading, computation, and judgment. Similar skills are required at home in reading and filling out forms for mail-order catalogs and in paying some bills. Instruction that alternates applying the same strategies to workplace and home materials offers an increased possibility for practice. Data is not yet available on the effectiveness of this strategy in stemming learning loss.

EFFECTIVE WORKPLACE LITERACY PROGRAMS

To be effective, therefore, workplace literacy programs must have well designed instruction and they must be flexible enough to meet both the needs of differing learners and of changing situations on the job. The discussion so far has highlighted the importance of designing programs which integrate workplace basic skills instruction with several other types of instruction, for example, technical training,

E.S.L. training, G.E.D. instruction, and low level literacy training. It has emphasized the importance of countering lack of transfer and learning loss by providing long-term practice with materials and activities directly related to the learners' everyday demands. Additional elements of effective programs are apparent as we examine more workplace literacy training across the country.

Salient Features of Effective Programs

A recent study of 37 workplace literacy programs funded by the U. S. federal government (Kutner et al, 1991) identified four key components of effective programs. One of these elements related to directly linking instructional materials to literacy tasks identified during job analyses. This connection was discussed at some length earlier in this chapter. In addition to this clear link between instruction and job tasks, effective programs were characterized by:

1) active involvement by project partners;

2) active involvement by employees in determining literacy needs;

3) systematic analysis of on-the-job literacy requirements.

Bussert (1991) reported most workplace literacy programs involve partnerships of some sort. Bussert analyzed descriptions of 107 U.S. workplace literacy programs and found 92% to involve 2 or more partners. Sometimes the partners were multiple unions or multiple businesses; or a school and business; or a government agency, a business, and a union. The most common types of partnerships among the programs she surveyed were the following:

- Employers working with others 88%
- Schools (public school, community college, and university) working in partnership with others 51%
- Unions working with others 34%.

Recruitment and retention were reported to be effective when each partner played an active role during the early stages of program development and a continuing role in supporting program goals.

Involvement went beyond leaders, however, to include learners themselves, who helped gather materials and made suggestions for expanding the collection of custom-designed materials. It was usually those closest to the job who knew what strategies would be most effective in gathering information and solving job problems. Active participation of partners sometimes meant supervisors and top job performers helping to analyze job tasks and suggesting materials and approaches which they found effective in preparing new workers.

A few specific examples of effective workplace programs can help illustrate these elements of effective programs. Earlier references to the military programs described by Sticht (1982) and to the computerized JSEP program described by Haigler (1990) touched on these elements. Now we will examine examples provided by Hargroves (1989) and Mikulecky & Strange (1986).

Boston Federal Reserve Bank's Skills Development Center

Hargroves (1989) describes a well-established workplace basic skills program in the banking industry. She presents the results of a 15 year comparison of the Federal Reserve Bank's basic skills trainees to a peer group of entry level workers in terms of: 1) the effectiveness of training in helping under-educated youth catch up, 2) retention, 3) job performance and 4) earning power. The Bank's skills development program integrated basic skills with clerical training, supervised work experience, and counseling. Trainees came into the program because they lacked basic skills which were needed in most clerical jobs. Though 50% of the trainees had graduated from high school, half read at or below the eighth grade level. Two out of three Skills trainees attended long enough to complete an extensive class and on-the-job training program leading to job placement at the Bank.

Hargroves (1989) gathered information on 207 Skills Center trainees from 1973 to 1988 and compared employment data to that of 301 Bank employees hired for entry-level positions from 1974 to 1986. Her results indicated that several months of formal training combined with on-the-job experience and counseling enabled under-

educated youth to catch up to typical entry-level workers. Two thirds of the trainees (who would not otherwise have been eligible for employment) were placed in jobs. The trainees, on the average, stayed longer than their entry-level peers, despite the fact that in the late 1980's there was a low unemployment rate and ample job opportunities outside the bank. The majority of Skills Center graduates earned as much as their entry-level peers who were both more educated and more experienced. "In summary, the program produced a supply of employees who were trained as well or better than other new entry-level employees and understood the Bank's employment practices; it also provided trainees to departments on short notice for extra clerical help" (Hargroves, 1989: 67).

Several elements key to program success were highlighted by the Hargroves study. These include: 1) integrating basic skills, clerical skills, work experience and intensive counseling, 2) self-paced and often one-on-one instruction focusing on competence, 3) connections to community agencies for recruitment, and 4) good communications with Bank supervisors in order to develop job placements.

Two Long-Term Integrated Skill Programs

Mikulecky and Strange (1986) reported on a program to train word processor operators and a second program to train wastewater treatment workers. Each program involved extensive training time. The word processor operators were paid to attend between 14 and 20 weeks of training, 40 hours per week. The number of weeks was determined by their ability to function at levels comparable to those of average word processor operators who were currently employed. The training program for the wastewater treatment plant involved 20 full weeks of voluntary training which alternated classroom training with on-the-job training. The word processor training program screened applicants and accepted no applicants who read more than 3 grade levels below the difficulty level of the business materials read, typed and edited by existing word processor operators. These materials ranged from high school to college level in difficulty. The wastewater treatment training program, on the other hand, provided

approximately 100 hours of special literacy support for the least academically able of its workers. This support focused on preparing the use of job and training materials which averaged from 11th grade to college level in difficulty. Employers and top-performing workers helped to analyze job tasks and provide benchmarks for acceptable performance.

The average learner in the word processor training program reached job-level competence in 20 weeks. Some of the trainees were able to find employment in 14 weeks, while a few took nearly 28 weeks. The program concluded in the middle of a recession, during which 1/3 of the cooperating companies stopped all hiring. In spite of these economic difficulties, 70 percent of the program participants found employment as word processors within two months of completing the program.

The wastewater treatment program focused on the least literate 20 percent of its workers. Nearly 1/2 passed their technical training post tests. The consensus of technical instructors was that less than 5 percent would have passed without the support of the literacy program. Of students attending special training sessions, nearly 70 percent were able to summarize job materials in their own words by the end of training. Only about 10 percent of the learners demonstrated gains in general reading abilities and those were students who invested 5 or more hours weekly outside of class on general reading materials. Retention of students receiving special basic skills training was higher than that of more able students who attended technical training only.

CONCLUSION

No single class or course seems able to meet the demands of the diverse populations within a workplace nor to provide a sufficient amount of instruction to move very low-level literates to the functional literacy levels called for in today's workplace. Multi-strand approaches, which involve several different types of courses and

strings of educational experiences leading to long-term training goals, appear to offer the highest probability of success. Such programs need to encourage learners to practice and retain new skills by linking training materials to job and home literacy demands. The active involvement of workplace partners appears to be key to establishing those links and to systematically analyzing program effectiveness. Relatively few workplace literacy programs meet *all* these effectiveness criteria, but the degree to which these criteria can be accommodated appears directly related to program success.

CHAPTER 2

Methods for Evaluating Workplace Literacy Programs

OVERVIEW

The previous chapter presented examples of effective workplace literacy programs and identified key program parameters. To evaluate workplace literacy programs effectively, two types of evaluation are desirable -- formative evaluation and summative evaluation.

Formative evaluation of a workplace literacy program takes place during beginning and middle stages of program operation. The purpose is to identify problem areas which can be addressed and modified while change is still possible and productive. This type of evaluation usually involves the use of interviews, document analysis, and observations to determine:

- the degree to which all involved with the program understand and share program goals;
- whether the resources in terms of personnel, materials, learning environment, and learner time are sufficient, given current knowledge, to achieve the goals;
- whether the learning processes and methods employed appear to be sufficient to accomplish the goals.

Summative evaluation of workplace literacy programs usually takes place at the end of program operation and is designed to assess how well the program has succeeded. This sort of evaluation requires gathering pre and post program data and then analyzing that data. This implies using and developing measures directly related to program goals. Typical goals for workplace literacy programs include improved learner literacy abilities, improved literacy practices at work and elsewhere, changed learner beliefs about literacy, self, and

education, and improved learner productivity on the job. Assessment is often accomplished through use of formal standardized tests, informally constructed tests related to the workplace, questionnaires related to literacy practices, and interviews with learners and supervisors. In addition, company records and ratings on productivity, safety, attendance, and enrollment in subsequent classes can expand the evidence available for assessing program impact.

CURRENT WORKPLACE LITERACY PROGRAM EVALUATIONS

Only a few workplace literacy programs described in the research literature report rigorous program evaluations or careful documentation of learner gains, impacts on productivity, and detailed descriptions of effective program practices. Some of these programs have been cited in the previous chapter. See, for example, Sticht (1982), Mikulecky & Strange (1986), Hargroves (1989), Haigler (1990) and Philippi (1988, 1991).

The above examples are atypical. Mikulecky and d'Adamo-Weinstein (1991) observe that the majority of workplace literacy programs described in the available research literature tend to report no rigorous evaluation data. Many programs which do report evaluation data simply provide superficial information limited to surveys of learner satisfaction and anecdotal reports of effectiveness. Occasionally a pre and post administration of a standardized reading test (usually the Test of Adult Basic Education - TABE or the Adult Basic Learning Examination - ABLE) provides an indication of learner gain in general reading ability. Only a few evaluations provide follow-up data on the impact of programs on learner job performance, retention, or earning power.

Kutner, Sherman, Webb & Fisher (1991) recently reviewed workplace literacy programs funded by the U. S. Department of Education to determine the elements of effective programs. The authors examined 29 of 37 projects funded by the National Workplace Literacy Program to determine which programs were effective and

merited further examination in order to identify components of effective programs. The authors reported that:

> "Due to the absence of quantitative data necessary to identify particularly effective projects (i.e. improved productivity, low participant attrition, or improved test scores), study sites were recommended to OVAE staff. These sites were reported by project directors to have a high retention rate." (1991:26)

Even in federally funded workplace literacy programs, for which program evaluation was an expectation for receiving funding, it was not possible to find six programs which had been rigorously evaluated for effectiveness. Selection of "effective" programs was based upon undocumented reports of retention from program directors.

FORMATIVE AND SUMMATIVE EVALUATIONS

It is possible to evaluate workplace literacy programs effectively using a combination of formative and summative evaluation. Formative evaluation of a workplace literacy program takes place at the beginning and during program operation. The purpose is to identify problem areas which can be addressed and modified while change is still possible and productive. Summative evaluation of workplace literacy programs takes place at the end of program operation and is designed to assess how well the program has succeeded. Assessing this sort of summative program impact requires gathering pre and post program data and then analyzing that data.

Mikulecky, Philippi and Kloosterman have performed several such formative/summative evaluations using a version of Stufflebeam's (1974) Context, Input, Process, Product evaluation model modified for use with workplace literacy programs. In brief, the evaluation model employs the use of interviews, document analysis, observations, and test data to determine:

1) the degree to which all involved with the program understand and share program goals;

2) whether the resources in terms of personnel, materials, learning environment, and learner time

are sufficient, given current knowledge, to achieve the goals;

3) whether the learning processes and methods employed are sufficient to accomplish the goals.

These three evaluation goals provide information about the program in its formative stages. Results can be reported to program providers while there is still time to make program adjustments. A fourth, summative evaluation goal of this technique addresses:

4) what evidence exists that program goals have actually been accomplished.

Formative Evaluation

A significant portion of the formative evaluation occurs early during program planning and operation (i.e. during *formative* stages of program development). Formative analyses usually employ interviews, the examination of program documents, and on-site observations to focus upon the degree to which program goals are shared, the adequacy of resources for achieving those goals, and the degree to which program execution appears to match stated program goals.

Program Goals

Interviews, analysis of memos and planning documents, and early program observations often reveal that significant differences about program goals exist among funders, supervisors, instructors, materials designers and learners. Evaluation feedback during early program stages often initiates necessary clarification among program planners and participants. In some cases goals are expanded, in some cases goals are refined, and in some cases new vendors are sought.

Examples of interview questions designed to reveal the various views of program goals among the participants and leaders follow below.

Shared Goals

1. What do you consider to be the main purposes, goals, and objectives of the basic skills training program(s)?

2. Given the situation you find yourself in, what do you think are the most important things for an instructor to be doing?

Additional information can be gathered from published program descriptions and from program planning documents.

Resources

Resources refers to the expertise of key personnel, the available instructional space and materials, as well as the time available for instruction. Early examination of resources sometimes reveals that resources are insufficient to accomplish goals espoused by program planners. Typical deficiencies are: 1) insufficient learner time to accomplish purported goals, 2) lack of appropriate learning materials or lack of resources to develop custom-designed materials which match workplace literacy program goals, and 3) difficulty in finding instructors with knowledge or expertise about workplace literacy requirements. Information about resources can be gathered by examining program facilities and from interviewing key program personnel.

Examples of interview questions designed to elicit information about program resources follow below.

Resources

1. List training and experience you've had related to this job.

2. What is your assessment of the following:
   Materials
   Facilities

3. Please describe the following parts of the training program:
   Materials for diagnosing and testing learner abilities.
   How a learner's class and out of class learning time should be divided.
   How records are kept and what use is made of records.

Learning Processes and Methods

We know from research reported in the previous chapter that literacy improvement takes a significant amount of time and that *general* literacy instruction is not very effective for workplace applications. Observation of classroom instruction, materials, and schedules sometimes reveals potential problems with the learning processes and methods offered by the program. Examples are: 1) Insufficient learner practice time with literacy or too much class time allocated to discussion, 2) Teaching general reading instruction with school books, off the shelf materials, or sometimes materials and activities selected because the instructor has found them useful in other settings, and 3) Little feedback from instructors about learner accomplishments (sometimes instructors do not or cannot comment upon what individual learners can and cannot do).

Effective programs typically instruct learners using workplace related instructional activities and real or modified workplace materials. Teachers are familiar with job-literacy demands through direct observation or documented analyses of the jobs. When instruction using more general approaches or materials occurs, the teacher is usually able to relate the instruction to workplace needs. If instruction is not related to the workplace, it is because the program has simply elected to use a workplace classroom to address general literacy goals. In effective programs, no matter what the goal, sufficient learner practice time is available to allow reasonable expectation of success. Some effective programs even manage to expand practice time through homework.

Examining the *processes* used in a workplace literacy program can be accomplished through classroom observation, examination of learner records and assignments, and through interviews with learners and instructors. A great deal can be learned by asking instructors and learners to describe how they spent time during the previous class period. Information from such interviews can help determine if learning activities and time allocation match program goals or if learning time is insufficient to meet these goals.

Classroom observation also allows the observer to gather information on how much time both instructor and learner spend in various activities. This information can then be analyzed to determine whether instructors are allocating time in ways that reinforce stated goals and in ways which are likely to be productive for learners. A form for recording such observational information follows below.

Classroom Observation

Time	Student Activity	Teacher Activity	Comments
0			
05			

Make note of time spent by students actually reading or doing things. Also note time learners spend listening to the instructor. When learners are in small groups or working individually should be mentioned. Special note should be made when the instructor or a student demonstrates how to do something.

Summative Evaluation

While the formative evaluation provides early information about the effectiveness of program operation, the summative evaluation provides information about whether the program achieved its goals.

Evidence of Goal Attainment

Well-evaluated workplace literacy programs gather baseline data before instruction begins. Typically data is gathered on the reading abilities, practices, and beliefs of learners. In addition, pre-program data is gathered on worker productivity or any other goal espoused by the program. Data-gathering is accomplished using formal tests, informally constructed tests related to workplace expectations, questionnaires, and interviews with learners and sometimes with supervisors. In addition, company records on productivity, safety,

attendance, and enrollment in subsequent classes can expand the evidence available for assessing program impact.

This information establishes a base for later comparisons to end-of-program performance. At the end of the program, all learners are once again assessed using the same instruments. In some cases, it is possible to compare the performances of learners in a workplace literacy program to those of a control group of comparable employees who haven't yet been able to receive workplace literacy training. To do this, the control group takes pre and post assessments which parallel the instructional group.

Program goals determine the types of information gathered to assess program impact. For example, if the program is to improve the ability of learners to perform more effectively in quality assurance groups, evidence needs to be gathered on such performance before and after training. If training is supposed to have a positive impact on learner reading habits at home and at work, these, too, need to be assessed before and after the program.

Chapters 3, 4 and 5 will provide samples of methods and instruments for assessing the impact of workplace literacy programs on learner literacy abilities, practices, plans, and beliefs. In addition, methods for assessing the impact of workplace literacy programs upon productivity and upon the families of learners will be discussed and sample measures will be provided.

CONCLUSION

Only a few workplace literacy programs have been well evaluated, even though millions of dollars have been invested in their development and operation. To evaluate workplace literacy programs effectively it is desirable to perform both formative and summative evaluations. Formative evaluation takes place during beginning and middle stages of program operation and is designed to identify problem areas which can be addressed and modified while change is

still possible and productive. This type of evaluation usually involves the use of interviews, document analysis, and observations. Summative evaluation of workplace literacy programs usually takes place at the end of program operation and is designed to assess how well the program has succeeded. This sort of evaluation requires gathering pre and post program data and then analyzing that data. This implies using and developing measures directly related to program goals. Typical goals for workplace literacy programs include improved learner literacy abilities, improved literacy practices at work and elsewhere, changed learner beliefs about literacy, self, and education, and improved learner productivity on the job.

CHAPTER 3

Assessing Workplace Literacy Program Results

OVERVIEW

The summative evaluation of the impact of workplace literacy programs is best performed using a combination of standard assessment tools and custom-designed measures. The custom-designed measures usually reflect the types of reading done on the job and in training courses. In addition, they can focus upon special objectives central to the workplace literacy program (e.g., increased productivity, comprehending safety information). This chapter will discuss several standard and custom-designed measures and provide examples.

Among the topics discussed are:

- the advantages and disadvantages of standardized tests;
- the use of custom-designed measures, employing literacy task analyses to develop Cloze tests using reading passages from the workplace and job scenarios involving applications of literacy;
- obtaining broader indications of adult literacy growth by monitoring changes in learners' literacy beliefs, practices, processes and plans.

Model custom-designed measures, including Cloze tests, interviews and questionnaires are available in Appendices A - C.

STANDARDIZED TESTS

Standardized reading tests are sometimes used in workplace literacy programs as a means of identifying the *general* reading abilities of learners. These tests often employ multiple-choice questions and short reading passages (from a few sentences to a

paragraph or two). Some are based on tests developed for use in elementary and secondary schools.

The most commonly used tests are the Test of Adult Basic Education (TABE) and the Adult Basic Learning Examination (ABLE). Occasionally a workplace literacy program operating in conjunction with a Community College may use higher level *general* reading and study skills tests provided by the Community College.

Advantages

The advantages of using such tests are two-fold. Initially, the tests can provide information on the general reading abilities of potential learners. Many Community Colleges offering technical training courses, for example, will not enroll students with general reading or computational abilities below the eighth grade level. The National Assessment of Educational Progress results (Kirsch & Jungeblutt, 1986) indicated that approximately 20% of American adults read below the eighth grade level -- including a significant number of adults who have graduated from high school. In some industries, more than half of the hourly employees score below an eighth grade level. Such individuals are prime candidates for basic skills support before and during technical training. Sometimes, standardized tests can be used to help identify such individuals.

Secondly, standardized tests can be used as program pre and post assessments to measure gains in general reading abilities. Comparison of pre- and post-test scores can indicate the degree of effectiveness of a program. Also, post-test scores can indicate whether learners are ready to go on to textbooks and other general materials in technical training classes. These scores are generally indicative of how well someone can understand material with which he or she has little familiarity. For example, adults scoring at the 10th grade level on a standardized test would be very likely to have some difficulty with a textbook on an unfamiliar topic which was written above the 10th grade level. With some background knowledge on the topic, such people might be able to comprehend material a few grades

above their standardized test scores. It is extremely rare to find an individual who can comprehend material more than a few grade levels above his or her standardized test scores (i.e., even extensive background knowledge will nearly always be insufficient to allow a 6th grade reader to comprehend a manual written at the 11th-12th grade level).

Disadvantages

The disadvantages of using *only* standardized tests in workplace literacy programs has been mentioned in Chapter 1. These tests measure general reading abilities and not the special sorts of literacy skills required in the workplace. A learner in a general basic skills class may improve in general reading abilities. For example, a learner could move from a 5th grade level (i.e understanding the comics and very simple stories) to an 8th grade level (i.e. understanding the sports page and USA Today news stories). Though the improved reading ability may be of some use, the learner is not likely to be able to transfer those skills easily to reading an SPC chart, a technical manual, specialized work-orders, and industry-specific textbooks. The most efficient way to ensure improvement in these areas is to teach using these materials. Unfortunately, gains made in reading job-related materials may be only partially reflected in a standardized test which evaluates general reading skills.

More subtle criticisms have been leveled against standardized test use for evaluation of workplace literacy programs. First, the quality of information revealed by these tests presents incomplete pictures of adult learning (as described above, an adult may read familiar materials somewhat better than general standardized test scores indicate). Second, the effects of such test scores on teaching are considered to be adverse by some (i.e., when teachers teach to the test and sometimes ignore materials that learners need for the job). Third, the way in which standardized test scores are reported can be humiliating to adults and counterproductive to learning. Some educators argue that when adults are informed that their performances are equivalent to low grade levels (i.e. 6th grade or

lower), it becomes a reminder of their failure rather than an objective description of abilities.

Recommendation

Some workplace literacy programs find that the disadvantages of standardized tests outweigh the advantages and rely instead on interviews, questionnaires, and other indicators to assess program effectiveness. Such assessments are custom-designed for the program being evaluated. Other programs use standardized tests as part of a mix of assessments. If standardized tests are used, they should never be the sole measure of learner gain in a workplace literacy program.

CUSTOM - DESIGNED ASSESSMENTS

An alternative or a supplement to standardized tests are custom-designed instruments which are based on workplace materials and activities. To design such instruments and, indeed, to custom-design training programs, one first needs to determine how workers use literacy in a particular workplace. The first step is to perform a literacy task analysis.

Literacy Task Analysis

Literacy task analysis is a way of identifying those aspects of job tasks which require reading and problem solving. These analyses are performed using a combination of observations of workers, interviews with top performers, and gathering samples of print used in the workplace and training classes. The goal is to determine the mental processes used by top performers as they solve problems and complete tasks which involve literacy. This information can be used to construct both test scenarios and instructional materials. It is important that these two be developed together, so that tests can assess what learners are really taught and both can be linked directly to the workplace.

Observations and interviews with supervisors and workers are used to identify the areas in which performance needs to be improved.

Prime targets for literacy task analyses are tasks where basic skills deficiencies cost money or threaten health and safety. Other tasks can be identified by noting changes in the workplace (e.g., new technology, changed jobs or promotions) which confront some workers with new and sometimes troublesome literacy tasks.

A good deal has been written about how to perform literacy task analyses (see Mikulecky, 1985; U.S. Departments of Education and Labor, 1988; Drew & Mikulecky, 1988; Philippi, 1988 & 1991). Most techniques involve determining the *elements* of a task and the *strategies* (both visible and mental) employed to accomplish the task. For example, filling in forms in some quality assurance procedures involves the *elements* of reading two-column charts, computing using decimals, knowing special vocabulary and abbreviations, and being able to summarize sequences of events. Within each of these elements, top performers employ a variety of *strategies* (i.e. skimming, estimating, interpolating, etc.)

Philippi (1988) has identified a number of such elements and strategies which are listed below.

Vocabulary

Recognize common words and meanings

Recognize task related words with technical meanings

Identify word meanings from sentence context

Recognize meanings of common abbreviations and acronyms

Recognizing cause and effect, predicting outcomes

Use common knowledge to avoid hazard or injury

Apply preventive measures prior to task to minimize security or safety problems

Select appropriate course of action in an emergency

Inferential Comprehension

Determine figurative, idiomatic, and technical meanings of terms, using context clues or reference sources

Make an inference from text that does not explicitly provide required information

Organize information from multiple sources into a sequenced series of events

Interpret codes and symbols

Literal comprehension

Identify factual details or specifications within text

Follow detailed, sequential directions to complete a task

Determine the essential message of a paragraph or selection

Locating information within a text

Use table of contents, index, appendices, glossary, subsystems to locate information

Locate page, title, paragraph, figure, or chart needed to answer questions or solve a problem

Use skimming or scanning to determine whether or not text contains relevant information

Cross reference within and across source materials to select information to perform routine activity

Use a completed form to locate information needed to complete a task activity

Comparing and contrasting

Combine information from multiple sources

Select parts of a text or visual materials to complete a task

Identify similarities and differences in objects

Determine presence of a defect or extent of damage

Match objects by size, color, or significant marking

Classify objects by size, color, or significant marking

Distinguish between relevant and irrelevant information in texts or visuals

Using charts, diagrams and schematics

Obtain a factor specification from a two-column chart to find information

Obtain a factor specification from an intersection of row by column on a table or chart

Use a complex table or chart requiring cross-referencing within text material

Apply information from tables or graphs to locate malfunctions or to select a course of action

Use simple linear path of an organizational chart to list events in a sequential order

Use the linear path of a flow chart to provide visual and textual directions for a procedure, to arrive at a decision point or to provide alternative paths in problem solving

Isolate each major section presented in a schematic diagram

Isolate a problem component in a schematic and trace it to the cause of the problem

Interpret symbols to indicate direction of flow, text points, components, and diagrammatic decision points

Identify details, labels, numbers, and parts from an illustration or picture

Identify parts from a key or legend

Interpret drawing of cross-section for assembly or disassembly

Interpret a three-dimensional, or exploded view, of an object for assembly or disassembly

Follow sequenced illustrations or photographs as a guide

Materials and information gathered during literacy task analyses can be used to develop instructional materials as well as to develop custom-designed assessment instruments for workplace literacy

programs. Examples of such instruments (i.e., job-related Cloze tests and literacy scenarios) are discussed below.

Job-related Cloze Tests

Standardized tests reveal an individual's general reading ability. A Cloze test is a custom-designed measure to assess how well a person can comprehend a particular type of reading material (e.g., job-related information). From the materials gathered during the task analysis, representative prose passages of about 150 words can be selected for the construction of Cloze tests. This is done by omitting every fifth word from a passage, usually leaving the first and last sentences intact. This results in a passage containing about 25 blank spaces which the test-taker is asked to fill in, using the surrounding context of sense and grammar.

The ability of readers to replace missing words accurately correlates very highly with scores on traditional reading comprehension tests (Bormuth, 1969; Mikulecky & Diehl, 1980). A general rule of thumb is that being able to replace less than 35% of the missing words indicates that the passage is beyond the comprehension of the test-taker. In other words, if the reader can replace less than 9 out of 25 missing words, the reading is too difficult. Replacing 50% or more of the missing words indicates the ability to read and comprehend the material independently. So, in a passage with 25 blanks, a score of 13 shows that the reading is of a suitable standard for the reader. Scores between these values reflect the degree to which the reader needs some instructional help to comprehend fully what is being read. Nobody is ever expected to replace all the missing words correctly. A score of 50% is considered quite good, and making test-takers aware of this may defuse the frustration that they are likely to feel when unable to guess satisfactory words for a number of the blank spaces.

A sample Cloze test (with answers included) is provided below. The instructions include a practice example, since many readers have never taken a Cloze test before and sometimes require guidance in

getting started. Appendix C includes instructions for developing Cloze tests and some additional examples.

Name _____ Date _____

Cloze Exercise

In a cloze exercise, you try to guess which words are missing. For example, in the sentence below, a word is missing.

She looked before she _____ the street.
A good guess for the missing word is "crossed."
She looked before she *crossed* the street.

In the story below, try to guess and replace the missing words. Don't expect to get them all. Some are nearly impossible.

G.M Designs Safety for All Ages

We all like to think about the old days. Life seemed simpler and, in some ways, better then. But when it comes to _____ , the good old days _____ offer the same degree _____ safety as today's cars _____ trucks. Advancements in technology _____ the G.M. vehicle you _____ today among the safest _____ the world. Each G.M.

(continues to approximately 25 blanks)

Cloze Exercise key: *automobiles, didn't, of, and, make, purchase, in*

Job Problem Solving Simulations and Scenarios

Simulations and scenarios can be constructed by using actual materials from the workplace to assess the job literacy abilities of workers. Information and materials gathered during the task analysis form the basis for constructing job-like scenarios in which the learner reads and makes decisions based on written materials. Scenarios are usually constructed to reflect a range of material types (i.e. prose, documents, graphic material), and sometimes involve both reading and computation. If the range of learner reading abilities is likely to be wide, it is useful to construct scenario questions which range from fairly easy to fairly complex, so that all test-takers can experience success at some level.

Appendix A contains samples of job scenarios and directions for constructing such scenarios. For full range testing purposes, it is recommended that scenarios include process questions, factual questions, inference questions, and application questions. Process questions determine how the reader reads a passage: that is, the range and sophistication of reading strategies employed. Factual questions should have answers based directly on the reading material, answers to inference questions can involve deductions from several places in the reading, and application questions should relate the reading to the interviewee's background knowledge. (See the examples below.)

Process question

I am going to show you a newspaper article about your industry.

Explain to me how you would read this story in order to find out what the writer thinks.

Describe what you would look at. What would you be thinking about? How would you go about reading this story? What would you do first, then next, then next?

Factual question

How many employees does ASMO have in Statesville?

(Answer: 400. *Listed in article*)

Inference question

From the information provided about products, what do all four companies have in common?

(Answer: All of them make some sort of motor. *Requires the interviewee to search for commonalities not readily apparent.*)

Application question

What company makes products closest to your job at this facility? Why do you say so?

(Answer: Relate a product on the list to what the employee makes. *Requires the employee to sort through the information and then to apply it to his/her background knowledge.*)

In addition to their use in a pre-test to establish base-line data for assessment, job scenarios can be used at the beginning of a program to diagnose areas of learner difficulty. If the information on the scenarios is also part of a training curriculum, the scenarios can provide instructors with valuable information. For example, if a learner consistently has difficulty with inference questions across scenarios, the instructor can adjust instruction to provide more guidance and practice in this area. The instructor should not, however, provide detailed feedback to learners about their performance on the scenarios if the program intends to use those scenarios again as a post-test to assess learner gain and program effectiveness.

A test can be used a second time to indicate learner growth if the learner has not been taught or given feedback using the actual test. It is also important that sufficient time has passed between pre- and post-tests (six weeks is usually sufficient) for detailed memory to decay. If such time is not available, it is possible to develop two very similar tests and establish the comparability of the two scenarios by noting how a pilot group scores on them. This is a fairly lengthy procedure, but worthwhile if the tests will be used with many learners for several years. Once comparability has been established, the two forms of the scenario can be used as pre- and post-measures. However, using the same scenarios for both tests provides a more reliable means of establishing comparability.

Assessing a Broader Conception of Adult Literacy Learning

Lytle (1990 a & b) suggested that performance measures (tests and exercises) miss a good deal of important information about adult literacy learning. In addition to gains in literacy skills, adults may make changes in what they believe, how they behave, and in their aspirations. Lytle suggests several dimensions which constitute a fuller understanding of adult literacy and adult literacy growth. These dimensions are learner *beliefs* about literacy and themselves, learner literacy *practices*, the literacy *processes* employed by learners while

reading, and the *plans* a learner has which may involve literacy use.

Lytle's conceptual framework has been adapted to the present workplace literacy project to test the importance of these aspects of adult learning: beliefs, practices, process and plans, and in order to seek out ways to enhance learning. Information about these dimensions of learner literacy were gathered using a combination of questionnaire items, interview questions, and requests that learners explain their literacy strategies or processes while doing job scenarios.

Beliefs

In the interview, learners were asked to describe themselves as readers and writers and to describe someone who seemed to be very good at reading and writing. They were also asked to provide reasons for their answers. Changes in these beliefs are likely to precede changes in literacy abilities. Sample questions from the interview follow below and are available in Appendix A.

Beliefs

1. Describe someone you know who is good at reading and writing. What makes you choose this person?
2. How good do you consider yourself to be at reading and writing? What makes you think so?
3. Describe how you would like to be in terms of reading and writing. (*Probe* : Could you give me some examples?)

Practices

Learners were asked orally and in the questionnaire for information about the types of reading and writing they do on the job and off the job . They were asked to rate the difficulty they had in reading each item on a list that included books, signs, training manuals, pay stubs, charts and cartoons. They were also questioned about the frequency of their literacy-related activities: how often, for example, they read a newspaper, made a shopping list or visited a library, as well as how many books they owned. Information was also

sought about literacy practices in workplace situations which ranged from departmental meetings to handling broken equipment, from reading instruction manuals to reading a health insurance policy.

Sample interview and questionnaire items follow below and are available in Appendices A and B.

Practices

Interview item

Tell me the sorts of things you read and write away from work during a normal week.
(*For probe, ask:* "Can you give me more examples?")

Questionnaire items

1. First check only the things you've read in the past month.

   Now go back and rate your ability to read the items you've checked.

		poor				excellent
__	local newspapers	1	2	3	4	5
__	classified ads	1	2	3	4	5
__	telephone bills	1	2	3	4	5
__	TV guide listings	1	2	3	4	5
__	magazines	1	2	3	4	5

2. In the last 7 days how many times have you read a newpaper?

   ---

   0 1 2 3 4 5 6 7 8 9 10+

3. You talk a lot in team or department meetings, asking questions or sharing ideas.

   very like me 1 2 3 4 5 very unlike me

Process

In order to seek information about the processes which learners go through when reading work materials developed as part of the job scenarios (see description on pp. 32-34 above), some questions in

each scenario asked students to think aloud about the way they were reading the material. The purpose of these questions was to determine whether learners were employing sophisticated reading strategies (i.e. skimming, focussing, asking questions, etc.) and whether the choice and use of reading strategies improved as a result of training. Sample questions follow below and are available in Appendix A.

Process

I am going to show you a newspaper article about your industry.

Explain to me how you would read this story in order to find out what the writer thinks.

Describe what you would look at. What would you be thinking about? How would you go about reading this story? What would you do first, then next, then next?

Plans

Some questions in the interview sought information about the learners' plans, especially in relation to education and goals requiring increased literacy abilities. These questions asked for information about learner plans for 1 year, 5 years, and 10 years ahead. Sample questions follow below and are available in Appendix A.

Plans

Now I'd like to ask you about your plans. Explain how you see <u>reading and education as part of these plans:</u>

A. What are your plans for the next year?

B. What are your plans for the next 5 years?

C. What are your plans for the next 10 years?

CONCLUSION

Workplace literacy program impact is best measured using a mixture of standard assessment tests and custom-designed instruments. Standardized tests provide useful information about *general* reading ability, but may be misleading with regard to workplace literacy skills.

Custom designing starts with a literacy task analysis to identify aspects of job tasks which require reading and problem-solving, and in which performance needs to improve. Cloze tests based on workplace materials can be used to assess workers' abilities at job-related reading. Job scenarios can test their skills in using what they read, through process, factual, inference and application questions.

A broader conception of adult literacy learning can be assessed by seeking information about the learners' literacy beliefs, practices, processes and plans, using interviews and questionnaires.

CHAPTER 4

Assessing Impact on Family Literacy

OVERVIEW

Chapters 2 and 3 have considered the evaluation of workplace literacy programs in relationship to impact at the workplace. Workplace literacy programs also have effects on workers' families and children. This chapter examines means for evaluating those effects.

The chapter considers the factors which can be used to measure family literacy impact. A review of previous research on this topic is followed by a discussion of questionnaire and interview items used in the current evaluation of family impact of workplace literacy programs. The complete instruments appear in Appendices B and D.

Topics discussed are:

- socio-economic level of parents;
- education level of parents;
- aspiration of parents for their child's education;
- ability of parents to act as role models;
- promotion by parents of literacy activities.

WORKPLACE LITERACY PROGRAMS AND FAMILY LITERACY

It is possible for workplace literacy programs to affect not only learners' literacy levels and productivity on the job but also literacy in the workers' families. Home literacy activities can both benefit the employees' children and also increase the employees' literacy practice time. Program descriptions provide many anecdotal examples of these benefits. A young mother in a workplace literacy program at Planters LifeSavers in Virginia reports that she enrolled in the company's basic education program, not only to be able to help her seven children with

their homework, but also to persuade her oldest son that it is important to finish school (Cooper et al., 1988). Gross, Lee and Zuss (1988) reported that one workplace literacy student began to help her eight-year-old son with homework and was able to leave handwritten messages for her children.

The effect of literacy programs on the children and families of workers is often neglected in evaluating program effectiveness, however. At both sites in the current study, assessment of family literacy was conducted through pre- and post- questionnaires modified from survey questions used by Greer and Mason (1988). The questions covered parental guidance, literacy artifacts, and child-initiated literacy behavior. In addition to individual questionnaires for parents, some parents were interviewed in focus groups. The Family Literacy Focus Group Interview was administered only to the participants of the program at one site and was based on the work of Fitzgerald, Spiegel, and Cunningham (1991). Samples of the questions from each of these instruments will accompany the discussion of the impact of parent literacy on their children which follows.

IMPACT MEASURES

At least five factors have been identified by research as related to the ability of parents to affect a child's achievement in literacy: the socio-economic status of the parents, their educational level, the aspirations parents have for their child's education, the ability of a parent to act as a role model, and the parents' promotion of literacy activities. Some of these factors are more easily altered than others through a workplace literacy program.

The first two, the direct correlation between the educational or socio-economic levels of parents and the child's literacy ability, have been identified by researchers as solidly linked (Chall, 1984; Laosa, 1984; Sticht, 1983; Sticht & McDonald, 1990). However, a brief workplace literacy program is not likely to affect income and general education levels directly nor very quickly. The latter three measures

are more likely to be affected by a workplace program.

Parents' aspirations for the best education for their children appears to be important in the child's own aspirations, as Marjoribanks found (1984a & b). Chall and Snow (1982) have shown that children whose mothers set high educational goals for them achieve higher levels of reading comprehension and word recognition.

Some research indicates that high educational aspirations for one's children may be connected to a parent's own educational level. Laosa (1982) found a significant relationship between a mother's educational aspirations for her child and the level of schooling of both parents. However, Lujan & Stolworthy (1986) found that the educational aspirations of lower socio-economic status families were just as sincere and ambitious as those of parents from middle to higher levels. Unfortunately, as important as having aspirations may be, parents who are unable to help their children reach such goals are at a disadvantage.

The ability to model reading and to engage in interactions with a child which encourage and teach literacy is important. However high the aspirations of a parent might be, Nickse et al.(1988) suggest that illiterate adults cannot model what they do not know. Fitzgerald et al. (1991) found that low-literacy parents did not even mention adult role modeling as important in interviews about how to help their children, whereas high-literacy parents talked about the need to have their children see them reading. Work with middle school students by Fielding, Wilson, and Anderson (1986) showed that readers among students tended to have parents and siblings who read. A parent's ability to model oral language skills also seems to affect a child's ability to read in school (Sticht, 1983; Loban, 1964; Chall & Snow, 1982).

In the current study, questionnaire and interview items were developed to measure effects in these areas. Examples follow below.

Questionnaire item

In the last 7 days how many times has your child seen you reading or writing?

0 1 2 3 4 5 6 7 8 9 10+

Interview item

At home, do your children see you doing any reading or writing? (i.e. books, magazines, papers, recipes, directions, letters, lists, notes, etc.)

Closely related to the parent as a role model is the activity of a parent to encourage a child in literacy activities. Included in such activities are the creation of a literacy environment in the home and the use of a community library. According to Fielding, Wilson and Anderson (1986) readers in middle schools come from homes in which there are many books and many opportunities to go to a library. Similarly, Greer and Mason (1988) found that the children who score higher on tests of reading recall are children who frequent a library, have someone at home who reads to them often and helps them read, and who have books and magazines purchased for them.

Parents who directly promote their children's reading have children who seem to do better in school. McCormick and Mason (1986) sent simple-to-read Little books home for parents to read to their preschool children. The parents were given instructions in helping their child learn to recite. That activity had a significant effect on the child's later reading in kindergarten and first grade. Furthermore, Chall and Snow (1982) discovered that reading comprehension was higher for the second, fourth, and sixth graders they studied if their homes provided more literacy experiences and reading materials which were both interesting and appropriate for the child. Stewart (1986) administered a reading test to 56 children and compared their scores to the answers their parents had given to a

questionnaire that assessed home support for early reading. He found a significant relationship between borrowing books from a public library and the children's performance on the test.

Assessing the literacy environment in terms of reading materials available in the home or trips to the library appears in questionnaire items.

1. In the last month how many times have you bought or borrowed books for your child?

   0 1 2 3 4 5 6 7 8 9 10+

2. In the last month how many times has your child gone to a public library?

   0 1 2 3 4 5 6 7 8 9 10+

Being a role model and providing materials are not the only ways parents improve children's literacy. Activities in which parents and children interact together are also important. Such activities include reading aloud to a child, encouraging the child to ask questions and make predictions about the text, allowing the child to initiate a literacy event, and parental involvement with the school. Both questionnaire items and questions from the Family Literacy Focus Group Interview address such activities.

Time spent reading with a child, particularly prior to the school-age years, can affect the child's later success or failure in reading. Stewart (1986) visited the homes of four children several times over a two-month period and learned that stimulation from parents made more of an impact on children's reading abilities than merely having several books around the house. In fact, the effect of reading aloud to children has been widely studied. Chomsky (1972) revealed that the most important activity for building the knowledge required for literacy success is reading aloud to children. Laosa (1982) found significant correlations between mothers who read to their children and the child's literacy skills in preschool. Buchanan-Berrigan (1989),

Anderson (1985), Teale (1984), Teale & Sulzby (1986), and Fitzgerald, Spiegel and Cunningham (1991) also indicate that reading aloud to children helps the development of preschool literacy, which, in turn, enhances school learning, especially when the child is an active participant.

Below are questionnaire items which assess such activity:

1. In the last 7 days how many times have you read/looked at books with your child or listened to him/her read?

   0 1 2 3 4 5 6 7 8 9 10+

2. In the last 7 days how many times have you helped your child with homework and/or with school projects?

   0 1 2 3 4 5 6 7 8 9 10+

Several studies have revealed that parents who have been observed reading to their young children are also found to encourage them to label pictures, ask questions, and relate text information to their own experiences (DeLoache & DeMendoza, 1985; Harkness & Miller, 1982; Snow & Ninio, 1986; Pellegrini, Brody, & Seigel, 1985; Yaden, 1982). As Mason & Stewart (1988) suggests, these parents are leading their children towards the use of inference and comprehension monitoring strategies. The benefits of reading aloud to children, therefore, seem to be greatest when the child is an active participant who engages in discussions about stories, learns to identify letters and words, and talks about the meaning of words (Anderson, 1985).

An interview question assessing such interactions follows below:

> Do you do any reading or writing activities with your children? (i.e., visit library, hear stories, read to them, watch educational television, look at magazines or books with children, point out words to them, play school, show them how to read or write, etc)

From reading with a child and encouraging the child's interaction with the text, a next step is to attend to whether the child ever initiates the reading activity. McCormick and Mason (1986) found that those parents provided with inexpensive books for their children reported significantly more child-initiated use of books and child-initiated attempts to print than did a control group. More importantly, they indicated that the children had invited their parents into literacy activities, such as asking to read stories to their parents and asking for help with new stories, to a greater extent than the children of a second group of parents who were not given books. Teale (1983) discovered that as children become more adept, they take over more and more of the interaction until they can read the book alone or write on their own without help.

Child-initiated behavior was more thoroughly examined by Lujan and Stolworthy (1986), who found that the most significant result from parent training was a positive change in most children's literacy behavior. For example, the children began to attend more closely to story time and parent instruction. They showed increased self-direction in organizing personal time so that there would be time at night for story reading.

Questionnaire items addressing these issues follow below.

1. In the last 7 days how many times has your child looked at or read books or magazines?

   0 1 2 3 4 5 6 7 8 9 10+

2. In the last 7 days how many times has your child asked to be read to?

   0 1 2 3 4 5 6 7 8 9 10+

3. In the last 7 days how many times has your child printed, made letters, or written?

   0 1 2 3 4 5 6 7 8 9 10+

CONCLUSION

Workplace literacy providers want to get the most for their investment. Effective programs may be able to improve the abilities of workers on the job while at the same time providing a benefit to children in the home. Longer term effects of increasing workers' literacy abilities can include examining the effects on a worker's family and children. Yet workplace literacy program evaluations often neglect such impacts. We know, too, that as workers are encouraged to carry newly-won literacy abilities home, they benefit from the opportunity to increase their own practice of these skills.

In assessing the effects of workplace programs on workers' families, five factors have been identified. These are:

1) socio-economic status of the parents;
2) parental educational level;
3) parents' aspirations for their child's education;
4) the ability of parents to model literacy practices;
5) parental encouragement of literacy practices with their children.

The first two are not as readily affected by short-term workplace programs and, therefore, are less desirable assessment targets.

Measurement of parental aspirations, modeling, and encouragement were conducted during the current study through questionnaires given before and after the program and through Family Literacy Focus Group Interviews.

CHAPTER 5

Assessing Impact on Productivity

OVERVIEW

A review of the literature on productivity assessment shows that little is known about the effect of workplace literacy programs on job performance, but there is some evidence of the value of such programs and of the costs associated with lack of training. Methods that can be used to assess workplace literacy programs include the following.

A training program can be assessed for its impact on productivity using employee output, and such indicators as safety, absenteeism and retention, with these measures being taken both before and after training. Also, employees can be rated by their supervisors on various aspects of job competence and attitude, and changes in these ratings could be used in the calculation of the dollar value of the program to the company.

Such methods and others directly related to literacy were incorporated into this study. To measure changes produced by a program, the following instruments were used both before and after training:

- Employee performance was assessed using records of absenteeism, safety, discipline, grievances and suggestions.
- Interviews and questionnaires were used to assess employee practices and processes of job-related literacy.
- Supervisor ratings were obtained on various aspects of employee job competence and attitude.

LITERATURE ON PRODUCTIVITY ASSESSMENT

Workplace literacy programs have been offered by many organizations, both government and private, but not much is known

about the effect of such programs on the job performance of the employees involved. For the most part, these organizations have regarded literacy programs more as philanthropic than as business enterprises, and so have not considered it appropriate to subject them to their usual cost-benefit analyses.

There are, however, a number of indications that such programs can have a positive influence on the effectiveness of the workers involved. Collino et al (1988: 19, Note 17) mention a Blue Cross/Blue Shield program that has decreased turnover, improved performance and promotion prospects, as well as increasing motivation and self-confidence among employees. Also, the Federal Reserve Bank's Skills Development Center has had considerable success in training under-educated school dropouts up to a standard of job performance comparable to qualified entry-level workers (Hargroves, 1989).

In addition, there are a number of cases on record of the costs associated with employees' lack of basic skills:

- the inability to read a ruler wasted $700 worth of steel in one morning;
- the inaccurate use of new scheduling equipment cost $1 m to correct the resulting errors;
- employees at a lumber camp imitated the illustrations on safety posters because they could not read the text describing these as dangerous practices to be avoided (Collino et al, 1988: 11-12).

However, the fact remains that, as noted earlier in this book, there has been very little systematic evaluation of workplace literacy, even of its effect on the employees' more general ability to cope with everyday literacy demands. So it is perhaps hardly surprising that two recent reports should come to the following conclusions.

> "Very little research exists about the relationship of literacy to job performance. Much of what exists is sketchy and based on information obtained from studies conducted in the military" (U.S. Depts of Education and Labor, 1988: 37).

Collino et al (1988) found that, even when companies do conduct

assessments of their literacy programs, the results are not made public. Furthermore, such assessments rarely involve a study of how productivity might be affected:

> "At best management relied on informal feedback of supervisors regarding employee performance" (Collino et al, 1988: 9).

METHODS OF USE FOR WORKPLACE LITERACY PROGRAMS

A workplace literacy program should have a positive and measurable impact on productivity. However, most companies do not have an evaluation methodology and therefore can not easily recognize the impact on productivity of training workers.

Impact on productivity

Though little research exists on methods to assess the impact on productivity of workplace literacy programs, more research and discussion is available on the general topic of the impact of training upon productivity (National Research Council, 1979). When workers are producing an actual physical output, any change in the quantity or quality of that output can be measured for the same workers before and after training or a comparison can be made between the output of trained and untrained workers. Programs that make such assessments are usually broad range training programs which can compare the output of a trained plant, division or work-team to a comparable control group. Assessing productivity impact at levels below the work-team is often precluded because many industries do not collect productivity information (i.e. production and defect rates) at the individual level.

A broader definition of productivity allows for some information to be collected at the individual level. For example, other factors that may be affected by a training program are

- retention and promotion;
- absenteeism and punctuality;
- dishonesty;

- accident rates;
- use of suggestion boxes.

In addition, if productivity is broadly defined as supporting corporate goals, increased participation in voluntary activities (e.g., additional training or employee quality participation groups) can also be included among productivity indices. (See for example Collino et al, 1988; U.S. Depts of Education and Labor, 1988.) All of these factors can be made the subjects of comparison, both of employees before and after a program and of those employees with others not attending the program.

Supervisor ratings

Another way of obtaining information about the effect of training on individual workers is to use supervisor ratings. These can be a single score for each employee or, preferably, a set of scores covering various specific skills and attitudes associated with job performance. Depending on the nature of the work concerned, these aspects are likely to include:

- setting up and operating machines;
- keeping up-to-date with paperwork;
- taking responsibility for their own work;
- having the initiative to solve problems as they occur;
- communicating with other workers;
- being committed to company goals.

For each aspect, a rating scale can be set up with descriptions of worker performance at low, average and high levels. For example, in order for supervisors to rate, on a scale from 1 to 10, workers' initiative in dealing with machine errors, the descriptions might be:

rating of 2 - ignores machine errors and lets them build up rating of 5 - realizes machine errors and attempts solution rating of 8 - monitors machine errors and deals with them

These descriptions serve to anchor the rating scale to specific worker behaviors, in order to produce consistent ratings between supervisors and from the same supervisor in pre- and post-training assessments. Developing the descriptions with the help of workers and supervisors enables them to be a realistic reflection of job practice. For examples of supervisor ratings, see Appendix G.

Such job performance scales anchored to validated behaviors have proven to be useful in lowering error, increasing reliability, and being efficient in terms of job performance ratings (Borman, 1977; Latham, Wexley & Pursell, 1975). Job performance scales anchored to behaviors have proven to be most effective when special care is taken in describing the job dimensions to be evaluated (Dickinson, 1977) and when unambiguous anchor descriptions are developed with involvement from job incumbents and the supervisors who are to participate in rating job performance (Norton, Balloun & Konstantinovich, 1980). Mikulecky & Winchester (1983) and Mikulecky & Ehlinger (1986) have successfully used such anchored supervisor ratings to assess job performance in the nursing profession and the electronics industry.

An alternative supervisor rating approach is to use an overall assessment of the performance of each employee, as rated by their supervisors, to calculate the "Utility" of the training or literacy program in terms of its benefits minus its costs. (See Sheppeck & Cohen, 1985; Schmidt, Hunter & Pearlman, 1982; Cascio, 1982.) For this calculation, other factors required are an estimate of the difference in dollar value to the company between an outstanding and an average employee, the likely duration of the training's effect, and the cost of the program. (See the Endnote to this chapter for an example of a utility calculation and further details concerning the use of this method.)

METHODS INCORPORATED INTO THIS STUDY

For this project, indicators relating to productivity were gathered on each employee both before and after the training program or, in the case of on-going programs (such as GED classes), at suitably spaced intervals. These included statistics on attendance, safety and suggestions. Interviews with employees and questionnaires that they filled out assessed their attitudes to the workplace and various job-related skills. Also, supervisors assisted in the development of anchored rating scales which they then used to assess each employee before and after training.

Productivity data

It was not possible to obtain data on the actual output of the individual employees involved in training, for two different reasons at the two companies participating in this project. As mentioned above, companies do not gather such data for units below that of the work team; so, at both sites, the attempt was made to have a whole team take part in training at the same time. However, at one site, the composition of the class could not in the end be arranged in that way, as teams were re-organized and some individuals could not be released for training. And, at the other, although a team did go through training together, data for that team could not be separated out from plant-wide figures for individual analysis. Thus, in order for the gathering of output data to be successful, it must be possible for a company to arrange training for a whole work team and for mechanisms to be put in place, perhaps specially for this purpose, to obtain the output data for that team.

The following measures were, in fact, used to evaluate changes in employee performance, each measure being taken both early and late in each program for the employees involved, so as to assess the impact of that program. In addition, comparisons were made in one case with a control group of employees who had not yet participated in that program.

Data relating to employee attitudes were collected on:

- absenteeism;
- grievances submitted;
- discipline records;
- workplace safety records;
- suggestions made;
- suggestions accepted.

Interviews and questionnaires

To supplement these company records, employees were interviewed and also filled out questionnaires (see Appendices A and B). Their purpose was, in part, to assess attitudes toward the workplace and competencies associated with the workers' jobs. In the interviews, the employees were asked about the types and amounts of reading and writing they do on the job; this was to assess the quantity and quality of their workplace literacy activity. They were also asked to demonstrate specific skills related to their work, such as using a job aid or written information sheet, and a graph or table. Questions here were of two types: process and content. Process relates to how the workers go about using the item; for example,

- do they use job aids regularly;
- what parts of them do they look at;
- how long does it take them to read one.

Content questions are more specific to the particular item, asking for information that the workers should be able to obtain from the sheet in front of them, such as:

- what components do you need to make this part;
- how do you carry out this procedure;
- what does this graph show as the inventory value on a certain date.

Some content questions called for interpretation by the interviewee, drawing on the given information to make inferences about the situation; for example,

- why do you think the value fell during this particular month?;
- what might have caused this type of wastage to occur?

The questionnaire dealt, in part, with reading and talking in relation to the workers' jobs, particularly their abilities and confidence in reading instructions and talking in meetings. Among items of a more general nature that they were asked to rate as easy or hard to read were a number of work-related ones:

- job aids;
- part specifications;
- safety rules;
- benefit information;
- the plant newspaper.

In addition, they were asked to use a scale from "very like me" to "very unlike me" in rating such statements as:

- your ideas are often discussed in meetings;
- when written information is handed out, you read it to see what it is about;
- when paperwork comes to you about your job, you often have trouble reading it.

Supervisor ratings

To obtain another perspective on this information gathered directly from the employees, supervisors were asked to assess each worker on various aspects of job performance that contributed to productivity and were related to task competence, communication, teamwork and paperwork skills. These assessment instruments were developed with the assistance of those who would be using them, through interviews that determined what aspects should be covered and how to describe behaviors typical of top, average and bottom performers. Specific aspects included were the ability to

- set up and calibrate a machine;
- use recording forms;
- trouble-shoot machine errors.

Also assessed were attitude indices such as:

- how much they took responsibility for their own work;
- how well they worked as a member of a team;
- how committed they were to company goals.

For each of these aspects, anchoring descriptors for Bottom, Average, and Top performance were related to a scale from 1 to 10, guiding the supervisors in making their assessments.

Thus, the final supervisor rating form could contain instructions such as:

- An average employee would be rated 5.
- A top employee would be rated 8 or higher.
- A bottom employee would be rated 2 or lower.

And one item on a form could appear as follows (see Appendix G for further examples).

Paperwork

Bottom	**Average**	**Top**
intimidated by job-related paperwork and does it poorly	does job-related paperwork, simply keeping pace	completes all job-related paperwork and tries to improve procedures.

1 2 3 4 5 6 7 8 9 10

CONCLUSION

In order to assess the impact of a workplace literacy program on employer objectives, measures of productivity should be taken before and after training. Such measures include company records, employee interviews and questionnaires, and supervisor ratings.

Company records can supply information on output, safety, dishonesty, discipline and grievances, absenteeism and punctuality, retention and promotion, and productivity suggestions.

Employee interviews and questionnaires can supply information on attitudes and job practices and skills. These include how much reading and writing employees do in the workplace, how competent they are at various types of reading, and their confidence with reading and in meetings.

Supervisor ratings can also supply information on employees' job-related skills and attitudes. Using anchoring descriptors for top, average and bottom performers, rating scales can be developed to cover such aspects as task competence, communication, team work and paperwork skills.

Endnote - Calculation of "Utility" of Training.

Calculation of the "Utility" or cost effectiveness of a training program requires:

1. An overall measure of the job performance of each employee trained and of a comparable group of untrained workers. (This could be either a supervisor rating or be based on production outcomes.)
2. A measure of the dollar value to the company of the difference between outstanding and average employees. (This estimate of the standard deviation of performance is known as the "value".)
3. The expected duration of the training's effect.
4. The cost of the training.

As an example of a "Utility" calculation, let us suppose that the 20 employees who have completed a training program are rated by their supervisors, on average, at 65 out of 100. The untrained employees received an average of 50, with a standard deviation of 10. The trained workers are at a level of 1.5 standardized units above the untrained -- this is the performance difference. If it is estimated that the average

employee is worth $18,000 to the company and an outstanding one is worth $26,000, then an estimate of the "value" or standard deviation of employee performance is $8,000 (the difference between these two amounts). Suppose also that training costs $2,000 per employee and the effect of training is likely to last 3 years. Then we have:

"Utility" =

Years duration of effect	x	Number trained	x	Performance difference	x	Value	-	Number trained	x	Cost per trainee.
= 3	x	20	x	1.5	x	$8,000.	-	20	x	$2,000

= $720,000 - $40,000

= $680,000 net utility to the company

This formula was originally developed by Brogden (1949) and revised into its present form by Schmidt, Hunter, McKenzie & Muldrow (1979). For examples of its use, see Sheppeck & Cohen (1985), Schmidt, Mack & Hunter (1984), Schmidt, Hunter & Pearlman (1982) and Cascio (1982).

Criticisms of the method are to be found in Boudreau (1983) and Cronshaw & Alexander (1985); these are refuted by Hunter, Schmidt & Coggin (1988). Modifications to the procedure are suggested by Bobko et al. (1983) and Cascio & Ramos (1986); see also Cascio (1982). Comparative studies of such modifications are contained in Greer & Cascio (1987), Burke & Frederick (1986), and Weekley et al. (1985).

Part II

THE CURRENT STUDY

CHAPTER 6

Structure of Current Study

OVERVIEW

The purposes of this study were to develop an impact assessment model for workplace literacy programs and to produce data on the impact of programs at two sites. A secondary goal was to refine the model for use at other sites.

The two sites chosen are very different, but both operate established, effective and diverse programs, involving technical and communications training, GED and ESL classes.

Pre- and post-program data were gathered on learner job productivity, learner literacy attributes, and literacy practices with their families. Instruments and methods used to gather data included:

- learner interviews, tests and questionnaires, based on Lytle's "Beliefs, Practices, Process, Plans" adult literacy model;
- questionnaire items based on key practices for developing home literacy;
- productivity indicators such as attendance, safety and supervisor ratings of on-the-job use of literacy and communication skills.

The data were analysed using statistical comparisons of quantitative information, as well as qualitative and quantitative analyses of categories emerging from open-ended responses to interview questions.

PURPOSE

Although federal and private support funds thousands of workplace literacy programs, very few programs have been evaluated beyond a superficial level (Mikulecky and D'Adamo-Weinstein, 1991). Typical workplace literacy program evaluations involve anecdotal

61

reports, learner satisfaction questionnaires or pre and post results from a standardized basic skills test such as the T.A.B.E. or the A.B.L.E.

In late 1990, the National Center on Adult Literacy funded a project to develop and pilot a model for evaluating the impact of workplace literacy programs. During Year 1, parallel pilot studies of two workplace literacy programs were used to:

(1) develop an impact assessment model for workplace literacy programs;

(2) produce data on the impact of two quite different workplace literacy programs.

The goals of this first year's efforts were to refine the impact evaluation model so that it could be transferred to additional sites during subsequent years and to establish base-line data for the level of impact one could expect from established workplace literacy programs.

POPULATIONS

The evaluation model to assess the impact of workplace literacy programs was piloted at two sites: Delco Chassis of Rochester, New York and Cumberland Hardwoods of Sparta, Tennessee. Though the sites were chosen for their differences in size, demographics, location and industry, each site has a well-established workplace literacy program which addresses several different populations (i.e. technical communication and basic skills training, G.E.D. preparation, and English as Second Language preparation at Delco). Leaders at both companies see it as necessary for survival to increase employee involvement in the decision-making processes of day-to-day business. Each firm intends that those actually producing the goods will be able to decide, for example, whether machines require adjustment or whether their production line has stockpiled a sufficient quantity of product X and should switch to product Y.

Both companies run education programs judged by regular state

62

and federal acknowledgement to be effective, model examples of workplace literacy education. Since we were piloting new instruments for assessing the achievements of such programs, we wished to establish benchmarks with programs which had been independently judged to be good programs.

Classes and individuals at each site provided information through interviews, tests, checklists and questionnaires to assess the impact of programs upon learners, their productivity, and family literacy in learners' homes. In addition, curriculum materials were examined and classroom instruction observed.

Subjects and Locations: Delco

Site #1, Delco Chassis, is a large, unionized (International Union of Electrical Workers, Local 509), electrical motor manufacturing plant with over 3600 employees located in Rochester, New York. Employees are enrolled in an education program jointly operated by union and management in conjunction with state and regional agencies that provide some funding and help in providing instructors from the local school system. All learners were from the production teams. They participated in one of three types of class:

1) Technical Preparation - a 6 week, 7 hours per day course designed to prepare employees for subsequent technical training,

2) a GED preparation course which met in slightly varying time frames but generally 4 hours per week, and

3) an ESL course which met for 8 hours per week.

For the first of these, there was a control group, made up of workers who had not yet begun the Technical Preparation course. Each of these four groups consisted of 12 - 15 employees. In addition, a small control group (of 5) was available for the ESL group.

The Technical Preparation course is designed to prepare learners for the mathematics, reading, oral communication and blueprint reading skills judged to be prerequisite for further technical training. Readings and activities are a mixture of some plant-specific

materials and carefully selected off-the-shelf materials related to course objectives. Activities in the reading component of the course include study skills exercises, reading rate exercises, and in-class activities designed to increase learner motivation to read. An instructors' manual of several hundred pages outlines course objectives and suggests materials and activities. Instructors are provided by the local school system, after screening by union and management representatives. Those who have been retained to teach the course have been able to demonstrate to these representatives that they can structure their teaching to meet course objectives and receive high instructor ratings from learners.

The GED course involves a good deal of individualized study directed toward passing regularly scheduled GED tests. Learners used published test preparation materials as well as traditional school materials and work-book exercises from an extensive in-plant library. Use of individual learner folders, seat-work, some full-class discussion, and regular individual feed-back from experienced GED instructors characterizes how class time is spent.

The ESL class is team taught by an experienced English as Second Language instructor and a Delco employee able to speak Italian (the first language of many but not most employees in the class). Activities follow exercises in several published English as Second Language materials available in the Delco training center. Class time includes teacher demonstration of how to do language exercises, seat-work with both instructors providing individual feedback, and full-group discussion of correct answers and why answers are correct.

Demographic data on the Technical Preparation class revealed most students to be in their late 20's, averaging more than 12 years of education. The Test of Adult Basic Education is used by Delco to screen learners for placement in classes and provide some diagnostic information to instructors. Students in the Tech Prep class averaged near the top of the reading portion of the T.A.B.E. at between 11th-12th grade levels in ability before entering the class.

A control group of employees, not yet enrolled in the Tech Prep course, was interviewed and tested. Analysis of demographic data revealed the control group to be slightly older, with more males and more years of plant experience than the class group. In most other ways, the two groups were similar, however. No significant difference was found for education levels or for the reading comprehension scores on a Cloze test.

Demographic Information of Tech Prep and Control Groups

Characteristic	Tech Prep	Control
Age (mean in years)*	27.9	34.6
Sex (M : F)*	6 : 8	11 : 1
Service (mean in years)*	5.9	10.8
Education (mean in years)	12.28	12.33
Cloze Test Scores	10.86	9.58

* Significantly different at the $p < 0.05$ level of significance

Subjects and Locations: Cumberland

Site #2, Cumberland Hardwoods of Sparta, Tennessee, is a non-unionized, rural wood processing plant with approximately 300 employees. The plant produces several hardwood products for the furniture industry including drawer parts and components for kitchen cabinets. New technology and an ambitious quality assurance program have changed the nature of the work environment and of many traditional jobs. Cumberland has several small on-going training programs. Employees enrolled in the classes participating in this study were all from the plant floor.

One course at this site was entitled Communication and Collaboration - designed to train teams of employees involved in a given phase of the firm's operation. Several teams had already completed training in communications skills needed to work cooperatively as self-directed teams. The pilot study involved assessing two learning teams, each of 10 - 12 members, which the plant CEO described as the most difficult group of learners attempted so far.

A second program at this site was an on-going GED course with 6 students currently enrolled. The class is taught by an experienced Adult Basic Education instructor employed by the company. Instruction follows the demonstration and seat-work pattern described above for the Delco GED course. Earlier cycles of the GED course had allowed nearly 20 employees to complete the GED. However, because of the small number of current students and the fact that not all of them could be tested, insufficient data for useful analysis could be obtained for this group.

The small size of this company prevented the formation of any control groups for either class. Also, because Cumberland has had an active and successful education program for more than three years, only a small fraction of employees had not yet passed through the small firm's training courses.

INSTRUMENTS

Following a literature review for instruments and techniques employed to evaluate previous workplace literacy programs, a menu was constructed of available techniques for gathering data related to program impacts on productivity, learner gain and learner families.

At each site, plant-gathered indices of productivity were surveyed and discussed until an agreed upon list could be developed for the site. In addition, supervisors participated in developing anchored rating scales on information processing tasks which were

plant specific (i.e., participation in meetings, doing quality assurance paperwork, etc.). These rating scales were used to rate learners before and after training. (See Appendix G for samples of these rating scales.)

Interview, test and classroom questionnaire data were collected for each learner before and after each course, or at suitable intervals for on-going classes. Lytle's conceptual framework for changes in adult literacy (i.e., Beliefs, Practices, Process and Plans - see Chapter 3) was used as an organizational principle for the interview and questionnaire. Information was gathered on learners' beliefs about literacy in general and their own literacy in particular. In addition, interviews and questionnaires focused upon literacy practices, the literacy processes and abilities demonstrated with workplace literacy tasks, and learners' plans for 1, 5 and 10 years ahead.

The instruments developed for the first phase involve a mixture of interview and questionnaire items which were to be used for all learners at all sites, and custom-designed tasks or job scenarios appropriate for particular sites and classes. For the Practices section of the questionnaire, site personnel added plant specific items to a more general list of reading material, which learners were to rate for difficulty. Questions related to literacy practices in work teams and in the plant were worded to reflect local language use. Questionnaire and focus group questions reflecting literacy practices with family members were also worded to reflect local use. For the Process section of the model, personnel at each site participated in analyzing workplace literacy tasks, and constructing Cloze tests and job scenario literacy tasks (i.e. reading plant newspapers or using job aids, forms, graphs, etc.) related to that workplace. (See Appendices A - D for sample instruments. The research rationale for construction of these instruments has been provided in Chapters 3 to 5.)

A significant amount of instrument development occurred at the Delco site. Considerable time was saved at the Cumberland site by using the Delco instruments as models for modification or to stimulate

the thoughts of plant personnel about what might be useful tasks for the custom-designed portion of the assessment.

Interview

An interview protocol was devised to cover the four aspects of Lytle's model. Concerning their Beliefs, learners were asked to describe a literate person they knew at work and elsewhere, as well as how literate they saw themselves now, and as becoming in future.

Concerning literacy Practices, learners were asked what reading and writing they had done recently, both at work and away from work. Literacy Process was tested using three different job-related items (i.e. a newsletter article, a graph and a job aid), which were all selected with the advice of the site coordinator. The subjects were asked to describe how they read or used the items, as well as answering questions about the specific contents. Finally, learners were asked about their future Plans, for 1, 5 and 10 years ahead, and how they saw reading and education as part of those plans.

Questionnaire and Cloze Test

A written questionnaire was also administered to participants during one of the first few class meetings, and again near the end of the course. Items dealt with the areas of literacy Beliefs and Practices, included a Cloze test based upon the local plant newspaper, and in addition contained questions about family literacy for those learners with children between the ages of 3 and 17. To complement the Beliefs questions in the interview (see above), the learners were asked to write down 4 or 5 words that described themselves as a reader and writer and to do the same for someone they saw as good at reading and writing. Further information about Practices was sought through a checklist of 20 possible types of reading material (e.g., books, signs, training manuals, pay stubs, charts, cartoons), for which the subjects were asked to rate, on a scale of 1 - 5, the difficulty they had in reading those of the items that they had read recently. They were also questioned about the frequency of literacy-related activities: how often, for example, they read a newspaper, made a shopping list or visited a

library, as well as how many books they owned. In relation to literacy at work, they were asked to respond, on a scale of 1 (very like me) to 5 (very unlike me), to 10 statements such as "I just listen in meetings", "My ideas are discussed in meetings", "I read information when it is handed out", and "I have trouble reading information sent out by management".

The questions about family literacy concentrated on literacy practices, particularly frequency of literacy activities: how often does the child look at books, read or ask to be read to, or visit a library; how often does the parent read to the child or help with reading; how many books has parent or child bought in the last year.

For each site, the coordinator helped to select, from workplace materials, a suitable passage for use in a Cloze Test, in which every fifth word was left blank. These passages were of a page in length, with about 25 blanks to be filled in.

Family Literacy Focus Group Interview

At the Cumberland site, a group of learners with children were interviewed about literacy Beliefs and Practices in the home. They were asked, for example, why they thought some children did better at school than others and what kinds of literacy-related materials they had available for their children. Questions used in the focus group interviews reflect categories developed by Fitzgerald, Spiegel and Cunningham (1991) in assessing home and parental factors related to children's success in school.

ESL Checklist

Evaluation of English as Second Language proficiency is not easily done with paper and pencil measures since speaking, listening, reading and writing are all involved. Typically, teacher checklists of a wide variety of behaviors serve as a diagnostic record and instructional guide, and as an informal assessment of progress.

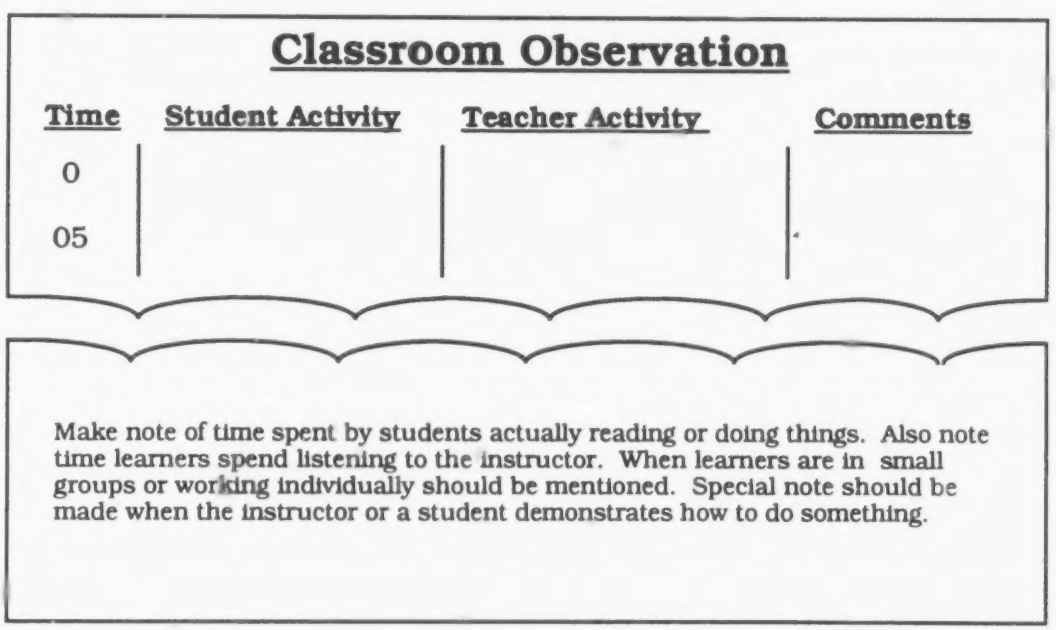
Bronstein (1991) has developed an extensive workplace-specific ESL checklist entitled: Benchmarks and student learning

69

profile for the workplace ESL program of the Labor Education Center at Southeastern Mass. University. Instructors at Delco reviewed this checklist, selected items appropriate to their site, modified other items, and added a few items specific to their classes and workplace. This resulted in a list of competencies at three levels (Beginner, Intermediate, Advanced) dealing with such areas as following instructions, looking up information, and filling out forms. (See Appendix F for a sample of this modified checklist.)

Class Observation Sheet

Classroom observations were performed by research personnel and on-site coordinators using a class observation form developed by Mikulecky (1990) and utilized by Mikulecky and Philippi (1990) and Philippi (1991) in school and workplace settings (see below and in Appendix E). The form requires observers to describe instructor activities and student activities, and make comments about the nature of class activities on a timed basis. Notations are then shared with the instructor to corroborate the accuracy of what has been observed and to make note of purposes for some activities.



Classroom Observation

Time	Student Activity	Teacher Activity	Comments
0			
05			

Make note of time spent by students actually reading or doing things. Also note time learners spend listening to the instructor. When learners are in small groups or working individually should be mentioned. Special note should be made when the instructor or a student demonstrates how to do something.

Productivity Information

Information on productivity needed to be custom selected for each worksite, though there was a small degree of overlap (i.e. attendance and safety records). In addition, each site participated in constructing plant specific supervisor ratings.

Plant Gathered Productivity Indicators

Management at Delco Chassis gathers a significant amount of employee data related to achieving corporate goals. Researchers, working with management and union personnel, reviewed this data to select productivity indicators which could possibly be influenced by successful learning experiences in the workplace literacy program. Learner and control group pre- and post- data was collected on absenteeism, suggestions submitted, suggestions approved for awards, grievances submitted, discipline records, and workplace safety records.

Supervisor ratings

Extensive interviews were conducted with supervisors and workers to determine aspects of jobs that contributed to productivity and were related to communication, teamwork and paperwork skills. Ten aspects of job performance emerged from interview data at the Delco plant and ten aspects were also used at the Cumberland plant. Supervisors then provided examples of behaviors which separated top from middle from bottom performers on each scale. These behaviors were used to develop anchored rating scales for each of the productivity categories. Supervisors then rated each worker on these scales both before training and after training. (See Appendix G for samples of these rating scales.)

DATA GATHERING PROCEDURES

Procedures for data gathering varied from instrument to instrument. Some were written directly by the learner or indirectly from the learner's comments, and others by the learner's teacher or supervisor, or by the researcher.

71

The interview and job scenarios were conducted by a researcher one-on-one with a learner. The researcher asked each question and made notes on the learner's responses, pausing long enough to obtain a considered answer, and using standard non-directive prompts and probes to elicit a more extensive response. The time taken for each individual interview was in the range 20 - 30 minutes. The Family Literacy Focus Group Interview was conducted in a similar fashion, and took about 10 - 15 minutes.

The questionnaire and cloze test were administered by the teacher during the class period. Each learner filled out the answers individually, with the teacher available to explain or clarify items when the learner was unsure what to do.

The ESL checklist was completed by the teacher of each student in an ESL class, and the class observation sheet was completed by a researcher while a class was in progress.

In some cases, supervisor productivity ratings were completed in conjunction with a researcher. At other times, rating forms needed to be left with supervisors. This divergence in procedure may have contributed to difficulties at the Delco plant in obtaining consistent supervisor ratings. (See Chapter 7 for more details on this.)

DATA ANALYSIS TECHNIQUES

Data analysis was of two types. Cloze test scores and quantifiable questionnaire and interview responses were recorded and analysed statistically. Responses to open-ended interview questions were recorded, and then methods of analysis were developed to fit the nature of the responses.

For some open-ended interview questions, categories of responses were allowed to emerge from data. These categories were then used to label subject comments. When category refinement allowed for acceptable levels of inter-rater agreement (90% or higher), category responses were recorded and statistically analysed.

72

For other open-ended interview questions, a holistic comparison was made between pre-test and post-test responses, and the change was rated as positive, neutral or negative. As with the category schemes, the criteria for assessing this change emerged from data, and the application of the scheme was subject to the same levels of acceptable inter-rater agreement.

Examples of both category and holistic rating schemes arose in connection with the interview question:

> "How literate do you consider yourself to be?
> What makes you think so?"

Responses to this open-ended question nearly always included spontaneously some kind of self-rating, using words such as "average", "very literate", "below average", "poor". These were categorized from lowest to highest on a scale of 1 - 5, to produce a score for each self-rating. In addition, a holistic rating was applied to the full response, in which change from pre-test to post-test was judged as positive, neutral or negative according to the subject's reported self-image and the reasons given for it.

For any of the responses which resulted in numerical scores, statistical tests were applied to the set of scores for each group of subjects. Pre- and post-assessments were compared for the individuals in a class using a paired-sample t-test, in order to detect gains brought about by the program. Where a class had a control group, the changes for the two groups were compared using a two-sample t-test. In addition, for the holistic change scores, the allocation of values +1, 0 and -1 to positive, neutral and negative allowed the use of a one-sample t-test to find if the changes were significantly different from 0. In all cases, as the tests were of "no difference" versus "improvement", the statistical tests were one-tailed.

CONCLUSION

This study's objective was to develop an evaluation model that can be used with most workplace literacy programs. A pilot evaluation

73

was conducted at two very different workplaces, where data was obtained on productivity, learner literacy attributes and learners' families. This data was gathered, before and after each course, using learner interviews and questionnaires, company records, and supervisor ratings of employees. Analysis of the data included coding, scoring and categorizing items, and applying statistical tests to detect improvements that had taken place during the time learners were in class.

CHAPTER 7

Results of Current Study

OVERVIEW

The main purpose of this chapter is to indicate which of the evaluation techniques employed have been most successful in detecting pre/post program changes in learners and their families, and in employer objectives. This will be illustrated using examples from

- the Technical Preparation class at Delco (often contrasting it with its control group);
- the GED class at Delco;
- the ESL class at Delco (making some comparisons with its small control group);
- the Communications and Collaboration class at Cumberland (to a lesser extent, as less data gathering could be done there).

Pre-test and post-test results were compared statistically and analytically for each class studied, on each aspect of measurement used: learner beliefs, practices, processes and abilities, and plans, family literacy and employer objectives. Program impact on learners from the various Delco and Cumberland classes is summarized below. (Tabular data are available in Appendix H.)

These results provide the principal basis for revising some aspects of the evaluation instruments and retaining others, as described in Chapter 8.

Learner Literacy

Changes in Beliefs

- View of a literate person - no change
- View of self as literate - significant gain for Technical Preparation, but not for control

75

Changes in Practices

- Reading and writing at work - significant gain for ESL, but not for control
- Participation in meetings - significant gain for Technical Preparation, but not for control
- Asking questions at work - significant gain for ESL (but not for control) and significant gain for Cumberland
- Reading and writing away from work - significant gain for Technical Preparation, but not for control
- Range of reading - significant gain for GED and ESL, but not for ESL control

Changes in Reported Reading Process and in Reading Comprehension

- Job-related cloze test - significant gain for Technical Preparation, but not for control
- Prose reading process - significant gain in responses (particularly topics mentioned) for GED and ESL, but not for ESL control
- Job scenario questions - significant gains for all Delco classes on questions of various difficulties
- Use of job aids - significant gain for ESL, but not for control

Changes in Plans

- Plans for 1 and 5 years - significant gain in focus and literacy goals for Technical Preparation, but not for control
- Reading and education in plans - significant gain for ESL, but not for control

Family Literacy

- No change for GED and ESL; number of parents in other groups too small for statistical analysis

Employer Objectives

- Attendance - no significant change for Delco groups
- Safety, suggestions, etc - numbers too small for statistical analysis
- Supervisor ratings - significant gain for Cumberland

76

CHANGES IN LEARNER LITERACY

Learner beliefs about their own literacy and about what it means to be a literate person were assessed with both questionnaire items and open-ended interview questions.

Beliefs

Subjects' views of what constitutes a literate person did not change significantly from pre-test to post-test, but it was noteworthy that their comments ranged quite widely, beyond the area of reading and writing, to include mention of broad-based intellectual and social qualities and the sorts of things literate persons were able to do. Examples of types of comments used to describe a literate person included mentioning such attributes as "college education", "knows a lot", "experienced", "has a better job", and such abilities as "well-organized", "competent", "helpful", "concerned", "good at solving problems". There were also more expected comments like "reads all the time", "understand what they read", and "writes well".

In response to the interview question "How literate do you consider yourself to be?", the Technical Preparation group showed a statistically significant improvement, and the ESL group also showed some numerical improvement. This was measured in two ways. Responses to this open-ended question nearly always included spontaneously some kind of self-rating, using words such as "poor", "average", and "very literate", which was scored on a scale of 1 - 5. (The three examples just given would score 1, 3, and 5, respectively.) A holistic rating was also applied to the full response, in which change from pre-test to post-test was judged by the reported self-image and the reasons given for it. These changes were rated as negative, zero or positive. For example, one learner's responses that received a positive rating were:

> Pre: "Not very literate- not much education."
>
> Post: "I'm average. I'm not stupid. I have common sense and can read and write."

77

Another made gains at an apparently different level:

> Pre: "Fair or average- a bit above. I understand some words, but others I don't. I'm not sure if it's literacy or memory."
>
> Post: "I'm more literate than I was before class - I understand more. I'm getting more interested in fiction, and fact. I look up words in the dictionary and thesaurus."

Pre/post changes for the self-rating and the holistic scores were statistically significant at the $p<0.02$ and $p<0.01$ levels for the Technical Preparation group. Control group scores showed no significant change.

A question about literacy beliefs, corresponding to that in the interview, was included in the written questionnaire. It asked the subjects to write down several words that described themselves as a reader and writer. This format did not produce the same result. Here, pre/post variation was due more to the number of words written down than to any change in the nature of the response. This illustrates an advantage that the interview had over the questionnaire in gathering richer data - a difference to which we shall return in later sections.

Thus it appears that access to learners' beliefs about literacy is more easily obtained through interviews than questionnaires, and their beliefs about themselves are more likely to change than their beliefs about others. So it is probably most useful to see the opening question on the interview protocol in Appendix A ("Describe a person you know who is good at reading and writing") more as a warm-up question to start the learner thinking about literacy than as one likely to produce evidence of change brought about by a program. The later questions, asking how good at reading and writing subjects consider themselves now, and likely to become in future, appear more responsive to change between pre- and post-assessment, and provide a useful measure of the effect of a program on a learner's beliefs about literacy.

Practices

Learners were questioned about their literacy practices, both at work and at home. Concerning work-related activities, they were asked in the interview to describe the kinds of reading and writing that their work had involved during the past week, and in the questionnaire to rate on a scale from 1 (very like me) to 5 (very unlike me) a number of statements relating to contributions in meetings and the reading of work-related materials.

The interview responses were assessed by a count of items mentioned, and by holistic pre/post change judged by the breadth, frequency and difficulty of the reading mentioned. In general, these measures showed pre/post gains. For the ESL class (but not for its control group), the changes were statistically significant ($p<0.05$ and $p<0.01$ for the two measures). The nature of the gains is illustrated by these sample responses.

Pre: "Newspaper - during break and lunch."

Post: "Read check sheets for parts, suggestions, bulletins, QUILS, monthly quality paper. Writing: Check off on sheet."

Pre: "Nothing really - just put parts on the line."

Post: "Bulletin at work. I can really read it now. The information is important. I read the magazine at work, also; it's new."

The one exception to this pattern of pre/post gains for workplace reading was the Technical Preparation group, which was in class full-time and therefore had not been doing their normal work for the duration of the course. For such full-time classes, it would be better to conduct the post-interviews a few weeks after subjects' return to normal work, in order to register any changes in work-related reading behavior resulting from their training.

Learner self-ratings on the statements about meetings and work-related reading showed very little pre/post change overall, but a few aspects are noteworthy. For the Technical Preparation group, two

79

items showed significant increase ($p<0.05$ for both): those concerned with talking in meetings and with having one's ideas discussed in meetings. For the ESL group, but not its control, the following item showed a significant increase ($p<0.05$):

When you need to know something at work, you usually ask someone about it.

very like me 1 2 3 4 5 very unlike me

This reflects an emphasis on oral work in the ESL class and shows a gain in confidence by these workers. This item also showed significant gains ($p<0.02$) for the Cumberland Communications and Collaboration class, which put much emphasis on working cooperatively with other workers. Thus, in both cases, skills dealt with in class produced changes in workplace behavior.

Turning now to literacy activities away from work, the learners were asked in the interview to describe the reading and writing that they did away from work, and in the questionnaire to rate themselves on their frequency of several literacy-related activities and their ownership of reading materials.

The interview responses were assessed by a count of items mentioned, and by holistic pre/post change judged by the breadth, frequency and difficulty of the reading mentioned (as described above for workplace reading). This showed statistically significant increases for the Technical Preparation class in both measures: the count of items and the holistic rating ($p<0.02$ and $p<0.005$); the control group showed no such increases. The GED group also registered some numerical gains, but the ESL group did not. The lack of change in reading and writing for the ESL class may be due to the emphasis on oral work already mentioned, or to their separate uses of English at work and their native language outside the workplace.

For the section of the questionnaire about frequency of literacy-related activities away from work and ownership of reading materials, no items showed significant change and it may be that changes in these areas of behavior and ownership are slow to take effect,

requiring more than the few weeks of time available between pre- and post-testing. In their post-interviews, a number of the learners expressed their positive intentions in such areas, but the stimulus from attending the course was then only beginning to produce changes in behavior. Comments of this kind included:

> "I have to do more reading for my daughter - especially now that I have more incentive from this class. It's like a spark."

> "After this course, I'm going back to night school. I'm really impressed with this class."

Though the Technical Preparation class did not improve significantly in home literacy behaviors, their improvement scores were significantly better ($p<0.01$) than those of the control group, which actually reported less home reading in the post-test. Perhaps this reflects a baseline of less general reading in summer (when the post-tests were conducted), because of the availability of other leisure activities.

In the questionnaire, learners were also presented with a list of 20 types of reading-- some general (e.g., newspapers, books, bills) and some plant specific (e.g., Delco Doings, suggestion forms, route sheets, paycheck stubs). They were asked to rate each on a scale from 1 (easy) to 5 (hard), also indicating which of the types they had read in the last month. This revealed a statistically wider range of reading in the post-assessment for the GED and ESL groups ($p<0.01$ and $p<0.002$). The ESL control group did not show such gains.

Few of the individual items showed significant change, but over half (about 11 of the 20 items, averaged over the 4 classes) were rated by learners to have greater perceived difficulty. This may mean that learners were being more realistic in the post-assessment, after greater exposure to reading generally, or just that they were unable to apply the scale consistently over the time gap between pre- and post-test. For those not accustomed to using scoring schemes, there may be a problem in such assessment, particulary self-assessment. (See also supervisor ratings in the Productivity section.) One aspect of this

 81

question's wording may also have contributed to the difficulty: if the learners had been asked first to indicate which of the types they had read recently and then to rate only those items, it is possible that more consistency might have been obtained.

These difficulties point up once again the inflexibility of a questionnaire and its dependence on the abilities and willingness of the person filling it out, compared with an interview in which the interviewer can explain a question and probe for further information to clarify the learner's intentions.

Process and Ability

In the interview, workers were asked to respond to both process and content questions on a plant newspaper article, a moderately complex graph, and a job instruction sheet. They were also given a Cloze test constructed from plant reading material.

The Cloze test used at Delco came from a plant newspaper article. The Technical Preparation class made statistically significant pre/post gains ($p<0.02$), while its control group did not. Nor did the GED and ESL groups, but the reason here appeared to be that the reading passage was too difficult for them. These two groups had mean scores of about 7 (out of 23 blanks to be filled), which indicates a frustrational reading level, but the Technical Preparation class and its control group had means of 10 or 11, well above the frustrational level. (50% replacement indicates an independent reading level, while below 35% indicates a frustrational reading level.) Given this range of reading ability, it would have been better to have had available two (or even three) Cloze tests of different difficulty levels, to be used as appropriate.

The Cumberland Cloze test used the plant safety rules, and here the mean score was 14 (of 25 blanks), showing that the test was well within the reading ability of those taking it. However, no pre/post

82

comparison was available at Cumberland, since the on-site coordinator managed only a single administration of the test.

A portion of the interview involved responding to a newspaper article, a graph and an instruction sheet in job-related scenarios. Learners tended to answer correctly the simpler fact-level content questions on the pre-test, so no gain in this area was apparent on the post-test. Significant gains were demonstrated on more complex items, which often called for the use of inference and interpretation. For example, the Technical Preparation group showed significant gains on the most difficult article and graph questions (e.g. "What happened to the inventory value in August and September?", which required learners to describe a trend), while the ESL group did so on those of medium difficulty (e.g. "What is the inventory value for the week of August 19?", which required reading from between two scale values). Since the levels of competence of the different groups (and individuals) varied, a greater range of difficulty in the sets of questions would have allowed improvements to show at an appropriate level. This would also have been assisted by a wider range of item types in each section, from the simple factual to more difficult interpretation questions.

When asked to read a plant newspaper article and describe how they read it (i.e. the processes they were using), learners' responses covered two main areas: reading strategies and topics of interest. Strategies included skimming, starting with headings and bold print, and reading the first and last paragraphs. Topics of interest included the products manufactured by competitor companies and the wages that they paid. Responses to this process question (reproduced below) included the following examples:

Describe what you would look at. What would you be thinking about? How would you go about reading this story?

Pre: "Check each heading and decide whether to go further."

Post: "Read the headings, get ideas about the companies, skim, know what they make, and know their customers and competitors."

Pre: "Read the first paragraph, read the headlines and bold print, and pick out what hits my attention."

Post: "Read the dark print first, then break it down from there and read what gets my attention. Also, I'd find out what it's about and what they are telling in it. Then, I'd read it in depth."

Pre: "Title, first paragraph, through the whole thing - analyze it."

Post: "Title, subject ("Delco Doings"), and function and operation of companies. I would look at Asia and Europe (competitive markets) to see how their prices are lower and higher."

Pre: "First the title, then I'd read from beginning to end."

Post: "Start at the beginning. Look at the areas and read all the way through. I'd also read about how Delco is trying to compete, its main customers and the percentage of wages and benefits. I'd read "Delco Doings" to find out about Delco's further needs. Reading these things makes you familiar with other companies."

These responses were analysed by counting the number of separate items mentioned by the interviewee. For all the Delco classes, the total number of responses and the number of topics mentioned increased numerically, and these were statistically significant for the GED and ESL groups ($p<0.005$ in both cases); the control groups showed no gains in these areas. The increase in the number of topics that the learners mentioned shows a greater ability to make connections between what they read and their own knowledge, as well as showing a growth in confidence arising from their time in class. For the most part, increased discussion of strategies included comments one would expect from more sophisticated readers.

In connection with the job instruction sheet, learners were asked about their use of such job aids, how long it took them to read one, and how difficult they found it. The only case of a statistically significant gain was for the ESL class (but not for its control group) in reply to a question about how likely they were to use a job aid. It appears that ESL learners' confidence in approaching job-related reading had been increased by their attendance of a class. Other

questions that involved self-reporting of reading skills were not successful, because of the interviewees' inability to gauge their own capacities. A question about the length of time it took to read a job aid produced a wide spectrum of answers: from 1-2 minutes up to a week. Responses at the bottom end of this range were clearly unrealistic: just one of the content questions tended to take more than 2 minutes. And responses like a day or a week seem to refer to the length of time needed, not only to read the job aid, but also to learn the job it relates to. Ambiguity in connection with such items may well preclude their effectiveness.

In all of the job scenarios (newspaper article, graph and instruction sheet), the content questions showed a considerable variation in response, both between groups and between individuals. To accommodate this, the set of questions for any one section needs to range in difficulty and in nature (involving fact, inference and application), so that there is room for improvement from pre- to post-test, at some level, for all those interviewed.

Plans

In the interview, learners were asked about their plans for the future: 1, 5 and 10 years ahead, and to explain how reading and education formed part of those plans. Assessed on how definite and detailed the plans were, the Tech Prep students showed significant pre/post improvements for 1 and 5 years ($p<0.02$ and $p<0.05$); these did not occur with the control group. The ESL class showed a significant increase in references to reading and education as part of their plans ($p<0.005$), which was not repeated for its control group.

Responses to planning questions ranged from learners mentioning their prospects for advancement in the company, or out of it, to their intentions regarding marriage, children, housing and retirement. The following are typical responses to the question:

What are your plans for the next year?

Pre: "Finish degree."

Post: "Getting married. Going to school - 4 nights a week in the fall."

Pre: "Have another child, learn new jobs in the same department, and get a new car.

Post: "Have another child, lose weight, take some course (I don't know what kind), and probably finish a degree in retail."

What are your plans for the next five years?

Pre: "Apprenticeship completed."

Post: "Have electrical apprenticeship, have kids - maybe, (and) perhaps buy another house."

Pre: "Go through the apprenticeship. This will take up a big amount of time."

Post: "Be done with the apprenticeship and definitely move up and off the assembly line."

Pre: "Ending an apprenticeship - journeyman or greater position."

Post: "I'd like to have a combination of school and owning my business."

The connection with literacy was made more explicit through the follow-up question about the role of reading and education in their plans, as these comments from the post-interview reveal in response to the prompt:

Explain how you see reading and education in these plans.

"Reading helps with everything. As you grow you learn. I want my life to grow."

"I need to develop and build confidence - do more reading - that's definitely important. Get my kids to do more of it."

"Get a better job by taking more classes. Help my kids read more - help them in school."

"If you can't read, you can't trouble-shoot the machines. "

"The more I learn, the easier it is to make suggestions about things and to apply for better positions."

> "I feel better after being in here and I want to learn more. I have to read a book on game for hunting. To retire, I need to read about benefits."

Overall, the learners were very positive about their experience in classes and saw them as opening new doors, both for further education and for a life of greater opportunity.

CHANGES IN FAMILY LITERACY

Measures of family literacy mainly involve information about how parents interact with their children in literacy-related activities. In addition, some of the parents' reading behavior away from work reflects upon changes in family literacy.

Learners with children between the ages of 3 and 17 were asked in the questionnaire about the frequency of such activities as reading to their child, helping the child with reading, and buying books for the child. Also, they were asked how often the child read alone, and what kinds of books or other materials (if any) the child borrowed from a library.

These questions revealed no statistically significant changes for the GED and ESL groups, the only ones for which the number of parents was large enough to draw any conclusions. These groups each contained 12 parents of children in the relevant age range, while the Technical Preparation class and the Cumberland group contained only 4 each.

However, the responses to these questions on family literacy did show slight overall gains, even though not statistically significant ones. It may be that the time between pre- and post-tests was not enough for any changes brought about by the classes to have much effect. It may also be that a larger sample size would have revealed the trend for improvement to be statistically significant. In addition, there is some evidence in the oral interviews about reading practices to indicate a movement towards more literacy activity for oneself and one's children. During post-test interviews, class members were

87

more likely to report newspaper, magazine and novel reading. Two parents, who had not previously mentioned reading to children, during post interviews mentioned "reading to my child" or "reading a children's book to my son." Another reported reading child care books and magazines on parenting. These had not been present during pre-interviews. One class member commented, "I definitely read a lot more since I started taking this course."

CHANGES IN MEETING EMPLOYER OBJECTIVES

In relation to worker productivity, measures used at Delco were attendance, safety records, suggestions submitted, suggestions approved for awards, grievances submitted, and discipline records. In addition, each site participated in constructing plant-specific supervisor ratings.

No significant changes occurred in learner attendance, but it was noted that, due to small sample size, the absence figures of a few individuals could affect the total quite markedly. For example, in the Technical Preparation group, half the absences in the post-training period are attributable to three employees. So, with samples this small, extreme caution should be used.

Other measures such as productivity suggestions and accident records involved numbers too small for statistical testing. Suggestions were made by only a few members of each group during the periods concerned and these followed no apparent pattern. Accidents were even rarer; for example, no Technical Preparation or control group member had an accident during the six weeks prior to training. Such figures do not allow statistical analysis.

At both Delco and Cumberland, supervisor ratings were devised to measure aspects of jobs that contributed to productivity and were related to communication, teamwork and paperwork skills. Extensive interviews were conducted to determine relevant skills and, at each site, ten aspects of job performance emerged from interview data.

88

Supervisors then provided examples of behaviors which separated top from middle from bottom performers on each scale. These behaviors were used to develop anchored rating scales for each of the productivity categories. Supervisors then rated each worker on these scales both before and after training.

At Delco, the supervisor ratings of the workers' job-related skills produced some anomalies that cast doubt on the consistency of the ratings from pre-test to post-test. Even though supervisors participated in scale development, some seemed to rate some workers exactly the same on all scales. Some of the ratings appeared to be carelessly done. Even with certain items and individuals removed to correct for this, no change was apparent. It may be that supervisors need more training or instruction before doing ratings, or that a time period of six weeks may be too short to register improvements.

At Cumberland, however, all ten aspects of the assessment scheme used there showed significant improvements ($p<0.0001$), over the 11 weeks of the classes. Here, just two individuals made the assessments and made them for the same workers in both pre- and post-tests, whereas at Delco up to four supervisors assessed the members of each group and there had been some personnel changes between pre- and post-test. Also, the Cumberland assessors had slightly more education and were not shop-floor supervisors, as at Delco; they may have had more experience in making judgments and ratings.

Another factor that may have contributed to the Cumberland results is the choice of assessment categories. These were very closely related to the objectives of the Communications and Collaboration course, covering such items as communication skills, problem-solving ability and conflict resolution. The Delco assessment referred mainly to specific job skills such as machine setting and record-keeping, but Delco courses were of a more diffuse job training nature, not relating directly to these skills. This tends to confirm the

notion that learners gain knowledge and skills only in the areas that are taught.

CONCLUSION

The instruments used in this study to measure the impact of literacy programs varied in their success at detecting pre/post changes in learner literacy, family literacy and employer objectives. The main results and some observations about assessment utility follow.

Learner Literacy

Beliefs

- Learners reported improvements in their view of themselves as literate, but not in their view of a literate person.
- Interview questions were more successful than questionnaire items in detecting changes in self-image.

Practices

- Reading practices at work improved in areas that related to the class attended.
- Full-time classes need to be post-tested some time after learners return to normal work, so that changes in work-related reading can take effect.
- Reading practices away from work improved for classes where home reading had been encouraged.
- Interviews were more sensitive to changes in reading practices than were questionnaires.
- Self-assessment of reading difficulty produced some inconsistencies that cast doubt on this questionnaire section.

Process and Ability

- Cloze test scores improved only when the passage was at an appropriate reading level, suggesting a need for several different test passages.
- Answers to process questions on job-related reading materials

showed improvements in reading strategies and topic connections.

- Answers to content questions on job-related reading materials showed improvements at various levels for different classes, suggesting a need for a range of difficulty and type in the questions.

Plans

- Learners were generally more definite and detailed in their plans for the future after attending classes.

Family Literacy

- Questionnaire items showed slight gains in some areas, but the time may have been too short for significant improvements to occur.

Employer Objectives

- Attendance showed no significant changes; with small groups, there is a problem of a few individuals' absence distorting totals.
- Safety, suggestions, etc were too infrequent for analysis.
- Supervisor ratings showed significant gains when areas covered related to the class, as well as the job.
- Consistent supervisor ratings are difficult to obtain across several supervisors and when personnel change from pre- to post-test. Education and experience levels of supervisors may also be a factor in obtaining consistency.

CHAPTER 8

Discussion and Implications

OVERVIEW

This pilot study has shown that it is possible to perform a broad-scale assessment of workplace literacy programs, in order to measure the impact on learners, their families and their productivity. The results of the study demonstrate some improvement in each aspect of the assessment model. However, gains appear to be limited to what is taught; there is very little transfer to other areas not addressed by instruction.

Learner change was measured in the areas of Beliefs, Plans, Practices, and Processes and Abilities. Where these formed a part of class instruction, learners made gains in the following areas:

- their literacy self-image;
- their ability to articulate plans;
- the amount and range of literacy activity both at work and away from work;
- reading strategies and comprehension.

Classes did not address directly issues of family literacy, and little change was evident in this area. Productivity measures proved, on the whole, to be unsatisfactory for the small numbers of learners studied, although supervisor ratings showed increases when areas assessed were closely related to instruction and company goals.

The evaluation model itself was also under scrutiny in this project. Several points of interest have arisen from the pilot assessment.

1) Questionnaires, although time-efficient, seem to be less effective than interviews in gathering accurate information.

2) Because of the range of learner abilities, workplace scenarios need to include questions of a variety of difficulties; cloze tests of varying difficulty may also be necessary.

3) It would be desirable to have direct measures of learner productivity, as well as more reliable ways of obtaining supervisor ratings.

PRINCIPAL ACHIEVEMENTS

A good deal has been learned from this pilot assessment. Initially, the pilot study has demonstrated that it is possible to perform a broad-scale assessment of workplace literacy programs using learner interviews, tests, and questionnaires within reasonable time-frames (i.e. 20-30 minutes of interviews and 10-15 minutes of tests and questionnaires, both before and again after instruction), as well as company records and supervisor rating scales. During subsequent studies, it will be determined if the assessment model can be transferred to additional workplace literacy programs with a minimum of technical assistance.

Secondarily, results from the assessment provide indications of what effective workplace literacy programs can accomplish and may not be able to accomplish. Discussion of these results will reflect and substantiate two major generalizations. These generalizations are:

1) Workplace literacy program instruction is able to demonstrate positive improvement in each area of the assessment model (i.e. beliefs, practices, processes and abilities, plans, productivity, and family literacy).

2) Gains seem to be limited to areas directly addressed by instruction (i.e. programs and classes accomplished gains *only* in areas where there was direct instructional activity). No clear carry-over or transfer to other areas is apparent in evaluation results.

IMPACT OF PROGRAMS AND LINK TO INSTRUCTION

Data were gathered for the learners in a range of classes: Technical Preparation, GED, ESL, and Communication and

Collaboration. Program impact results will be summarized and discussed in direct relation to the types of instruction in classes where gains were made. The types of instruction in classes not demonstrating gains in particular areas of the assessment model will also be discussed for comparison purposes.

Beliefs About Self as Literate

Changing adult learners' beliefs about their own literacy abilities is important for several reasons. An adult with a negative self-impression of his or her own ability is not likely to attempt literacy away from the supportive environment of a classroom and nurturing instructor. Significant growth in literacy abilities requires hundreds of hours of practice -- more than most programs can ever provide in class time. For this reason, it is important that learners become more independent by developing more positive self-beliefs about their literacy abilities. They need to see themselves as being capable of attempting more literacy and practicing more on their own, as opposed to avoiding literacy tasks and literacy practice. (Incidentally it is important that learner beliefs about their own literacy are also accurate or learners will feel betrayed when they realize they have been wrong, and that betrayal can lead to abandoning altogether much of what has been learned in classes).

Data about learner literacy beliefs were collected in all classes. Except in the GED class, learners demonstrated improved views of themselves as literates. This was mainly revealed during interviews through more positive self-descriptions and self-assessments.

In the Tech Prep class, learners were regularly able to monitor their own progress on reading comprehension and reading rate through class tests and discussions. In addition, class discussion time during seven-hour learning days often addressed future learning plans and why the skills students were mastering would be of use in future training.

The ESL class, similarly, used class discussion both to provide English practice and to highlight the relevance of what was being

learned to future use. Learners were asked to share, in journals and later oral discussion, personal accomplishments in written and oral English. This served both as an instructional tool to improve language use and also as a feedback mechanism for reinforcing learners' views about their own growing language and literacy competence.

The Communication and Collaboration class revolved substantially around the concept of joint and personal goal setting, planning for accomplishing goals, and monitoring effectiveness. Some goals related to direct job performance, but a substantial number related to improving individual communication abilities. Considerable time was expended on both individual and group monitoring of gains. An apparent result was expanded and improved beliefs about learners' own literacy abilities.

The GED class demonstrated no gains in the area of improved learners' beliefs about their own literacy abilities. The structure of classes did not lend itself to either substantial instructor feedback, group feedback, or individual monitoring in this area. Most work was individualized and directly related to completing practice exercises for the GED tests. Interviews with learners often indicated a workmanlike attitude toward how many exercises they had gone through with little sense of improved individual abilities beyond the class. Instruction did not focus on learners internalizing a sense of expanded personal abilities, and assessment did not reveal such changes in belief to have occurred. It is important to note that other assessment measures indicated that GED students were learning. They had actually improved in some literacy abilities and practices. The significant factor here is that *little class time was directed toward identifying and reinforcing growth in this area and concurrently no change in individual beliefs about changed literacy abilities was demonstrated.*

Plans

Interview questions about future plans and the relationship of literacy to those plans were asked of learners in the Tech Prep, GED,

and ESL classes. In the Tech Prep class, which was designed as a prelude to further training, a good deal of time was spent addressing study skills and the demands of future training. In this class, learners' post-class interviews revealed plans which were articulated with more focus and detail than had been true of pre-class interviews. A similar pattern occurred in the ESL class which sometimes used discussions of learners' futures as an activity for improving the use of oral English. Learners in the GED class, who primarily focused on passing the GED test and were involved mainly with individual seat-work, demonstrated no measurable change in the clarity or focus of their plans and made no greater mention of education and literacy as parts of future plans.

Literacy Practices

Changes in the amount and types of literacy practices used by learners were assessed by a combination of interview questions and questionnaire checklists and rating scales. The same pattern of gains directly related to classroom focus areas was revealed in assessment results in all classes.

The Tech Prep classes emphasized increased reading habits for learners. One instructor even took learners to the library, read portions of books and magazines aloud in class, and emphasized improved literacy habits. In the Tech Prep classes, even though the course title implies workplace applications, learners demonstrated increased reading and writing at home in post-interview questions compared to the literacy behaviors of the control group. Employees from only a few work-teams were enrolled in these classes and learners participated in a significant amount of group work in class with team members. Learners also reported statistically significant increases in willingness to offer ideas and discuss them in quality assurance meetings.

The ESL learners spent some class time on workplace literacy habits and practices by reading bulletin board items, newsletters, and job materials in class. Significant gains in pre/post literacy practices at work were reported by ESL learners. These gains were also

significantly greater than those of a small ESL control group who served as an indicator of changes resulting from simply living for a comparable period of time in an English-speaking environment. Little class time was allocated to home literacy activities and no significant improvement in this area was noted. Oral discussion of class exercises (such as how to convert statements to questions) took a significant amount of class time. The heavy emphasis on oral usage and asking questions led to significantly higher ratings for asking others for information in the workplace.

Learners in the Communication and Collaboration class also participated in a significant amount of group activity. They, too, showed gains on items involving question-asking and communicating in the workplace. Lack of post-assessment interviews prevented more extensive examination of changes in other literacy practices.

The GED class, which did not emphasize literacy practices at home or at work, did not show gains in these areas on interview items. Questionnaire checklists, however, revealed a statistically significant tendency for learners to report attempting a wider variety of reading and writing.

An interesting phenomenon was noted for GED and ESL learners' responses on these checklist items. In addition to indicating what types of materials they had read recently, learners were asked to indicate the difficulty they had reading these materials. Learners in both classes indicated that materials were harder to read at the end of the classes than they had been at the beginning of the classes. This suggests that low literates without much experience with reading may initially over-estimate their own abilities. It further suggests that instructors should not simply propose extra reading without providing support. When low literates realize that even simple materials are more difficult than they anticipated, they may become discouraged and retreat from reading them.

Reading Processes and Abilities

The most psychometrically rigorous measure of reading ability used in this study was the Cloze reading test. The Tech Prep class, which spent the most time in reading practice, was the only group to demonstrate statistically significant gain on this measure. GED and ESL learners, who found the newsletter story used in the Cloze test to be at their frustrational reading level when instruction began, found the high-school difficulty article still at frustrational reading level at the end of instruction. It is unlikely that learners in either group received enough reading practice to bring this brief story about General Motors vehicles within their comprehension ranges.

Job literacy scenarios provided a more diverse range of indicators of learner literacy processes and abilities across several types of workplace materials. Questions assessing the strategies used by learners in reading newsletter stories, graphs, and job aids revealed some change in the sophistication with which learners read. The Tech Prep class, which was comprised of high school graduates and several learners with some post high school education, scored very high on pre-class measures of how they went about reading. This class spent a good deal of time addressing study skills and reading strategies, and learners did score numerically higher on post-assessments than their already high pre-scores. Ceiling effects here made statistically significant improvements difficult to attain. ESL and GED learners demonstrated especially significant gains in topics focused upon. Even though they had not improved in reading abilities enough to do well with the earlier reported Cloze newsletter article, the reading practice received during their limited hours of instruction had led to a more sophisticated approach to reading. Control groups, who received no instruction, demonstrated no improvement from pre- to post-assessments of reading strategies.

Comprehension questions of increasing difficulty were also asked in the different job literacy scenarios. Learner gains again reflected learner instruction. Tech Prep learners, whose extensive class work addressed inference and problem-solving tasks, improved

most on the more difficult scenario questions. The ESL learners, who met eight hours each week and spent some time with workplace materials, improved most on middle level difficulty questions. The GED group, who met only four hours per week and did little with workplace materials, demonstrated gains on only one comprehension question related to workplace literacy. Once more, gains appear to be directly related to the type and amount of instruction received by learners.

Family Literacy

Some impact of instruction on home literacy has already been discussed in an earlier section on literacy practices. Learners in classes which focused upon home materials did improve home literacy practices; those in classes which did not focus on home materials made no changes. Only a relatively small number of learners had children and were therefore qualified to answer the family/parent literacy questionnaire items. No class spent direct instructional time on family literacy and no significant gains were noted in this area. Though not statistically significant, there was some indication of a few parents taking their own children to the library more often after learners from the Tech Prep class were taken to the library by their instructor. Similarly, a few parents reported reading to children slightly more often. These accounts were infrequent. It appears that benefits of instruction do not transfer very far beyond the focus of actual instructional activities.

Productivity

For a variety of reasons discussed in Chapters 6 and 7, few of the productivity assessments proved satisfactory for groups as small as the 12-15 member classes and control groups. There is some indication, however, that some productivity gains were directly related to type and amount of instruction received by learners. The only group to demonstrate consistently improved supervisor ratings in workplace-based communication and literacy use was the Cumberland Communication and Collaboration class. The entire class was structured to address these workplace communication demands.

Results suggested that this focused instruction was effective in these areas directly related to company goals. No comparable gains were demonstrated with Delco supervisor ratings, though difficulty in obtaining acceptable ratings clouds this finding. Questionnaire items dealing with participation in team meetings indicate that both Delco and Cumberland learners who participated in class group work and discussions did make significant gains with participation in discussions during team meetings. Again the relationship between instruction and improved performance is fairly direct.

Conclusions from Results

With workplace literacy instruction, it appears that you get what you pay for and not much more. Classes and instructors at the two sites demonstrated that what you choose to spend time on in class matters a great deal. Statistically significant gains were made by *some* students for every segment of the evaluation model. More detailed analysis reveals that gains occurred, however, only in areas directly addressed by instruction and class activity.

This is both good news and bad news. It is heartening to know that instruction works. Workplace literacy programs that focus on a specific goal and provide significant instruction toward that goal can help learners improve. If time is spent providing learners with feedback about their improved literacy performance and developing literacy habits at home and work, workers will improve their self-concepts about their own literacy and will read more. The bad news is that hopes for broad transfer from relatively brief programs (as nearly all workplace programs are) appear to be misplaced hopes. Whatever effective class activity focuses upon is the major area of gain. Even improvement in literacy practice appears tightly related and limited to classroom practice. If class time focuses only on workplace activities, practices appear to improve only with workplace literacy materials. For productivity to improve, instruction needs to focus directly on activities involved with production. Extra dividends of transfer to improved family literacy seem unlikely unless instructors also spend time with family literacy activities.

This implies some hard decision-making by instructional planners. The results of this study make it much more difficult to accept the contention that any single focus of literacy instruction will bring improvement in a multitude of areas. It also suggests that diffuse instruction, which touches lightly on many areas, will not bring about gains of any significance in any particular area. The GED group improved a little in general reading strategies and may have improved in taking the GED test, but there are no indications that much more occurred. Instructional planning did not focus on much beyond the GED goal. The ESL group improved in oral activities and in some workplace activities for which they received instruction, but not in areas where they received little instruction. These same patterns of instruction being directly and narrowly related to gains hold for the Tech Prep class and the Communication and Collaboration class.

This should not be taken to mean that workplace literacy instruction should always focus upon a single workplace goal. It is likely that the most beneficial mix is instruction which expands learner practice time beyond the classroom by improving worker literacy practices and beliefs at home and the workplace. Since 50 or even 200 hours of class time is not sufficient for many learners to reach their full potentials. the impact of precious class time must be, in part, to increase literacy practice and learner independence. If productivity is an issue, workplace materials and activities used in class should be directly related to materials and activities employed during production. If other goals are desirable, they must be planned for and it seems likely that additional learning time will also need to be provided.

WHAT HAS BEEN LEARNED ABOUT HOW TO EVALUATE PROGRAMS

One of the major goals of this study was to develop a model for evaluating workplace literacy programs. For the most part, the pilot assessments validated the utility of a broad-based conceptual framework of adult literacy learning in the workplace. It was possible and productive to note gains in areas of learner literacy beliefs,

practices, processes and abilities, plans, productivity and family activities. A good deal was also learned about the limitations and pitfalls of particular evaluation approaches and methods.

Limitations of Questionnaires

Time is at a premium in workplace literacy programs. Many programs are only able to provide brief instruction and still others lose money for each hour of learner time, since learners are not producing a profit while in class. To the degree that checklists and questionnaires can be used to gather information, as opposed to individual interviews, a substantial time saving can be made. This pilot assessment used overlapping oral interview and written questionnaire items to test the degree to which the assessment approaches produced similar findings. For the most part, questionnaires, though time-efficient, were much less effective and accurate than even brief face-to-face interviews. This was especially true in the areas of literacy beliefs and practices. In these areas, learner responses were very brief on written forms -- even with the more literate Tech Prep learners. Interviewers, however, waited until learners paused in speaking and then asked, "Anything else? or "Can you think of any other examples?" until they received the answer, "No." This produced a good deal more information and more accurate representations. Questionnaire responses in these areas probably more closely reflect the degree to which learners could read and wanted to write. The questionnaire responses tended to reinforce the interview responses, but questionnaire assessment was often not sensitive enough to detect changes -- especially on global questions about literacy beliefs or practices.

Questionnaires were effective when they could be focused. For example, descriptions of literacy behaviors in team meetings, listings of recently-read materials specific to a workplace, and descriptions of literacy behaviors with one's children were able to elicit information rapidly from learners. In cases where there was an overlap between interview questions and these questionnaire items (e.g. home literacy behaviors in the interview and family literacy behaviors in the

questionnaire), triangulation revealed the questionnaire items to reflect accurately the more extensive oral comments.

Job Literacy Scenarios

The custom-designed job literacy scenarios were specially designed to reflect workplace literacy tasks of importance at each worksite. They attempted also to reflect the range of reading types present in National Assessments of adult literacy (i.e. prose reading, document reading, and quantitative reading). The scenarios provided, as much as possible, a realistic purpose for reading and attempted to assess both how the learner went about reading (*processes*) and how well the learner understood and could use information from the reading (*abilities*).

These job literacy scenarios proved to be quite productive in assessing improvements in the sophistication with which learners approached reading tasks. The initial scenarios, which were limited to a very few comprehension questions, were somewhat productive, but need to be expanded to reflect more accurately gains in several types of reading (searching for facts, drawing inferences, and making applications beyond the task at hand). Instruments in Appendix A have been revised to reflect these changes.

Cloze Tests

The Cloze test was simple to construct and relatively easy to administer. Instructors reported little difficulty with the tests, which provided a sample sentence demonstrating how to fill in blanks. With the Tech Prep and Cumberland classes, the material selected was well within initial comprehension ranges. This was not true for GED and ESL learners at Delco, however. The high school difficulty level story was beyond most learners both before and after instruction. For low level learners, it would be desirable to construct a second Cloze test using simpler workplace materials.

Though some instructors at pilot sites were familiar with the Cloze test procedure, others were not. Directions for how to develop and interpret Cloze tests were created for instructors. These are also

included in Appendix C with samples of Cloze tests developed at the pilot sites.

Family Literacy Questions

Both oral focus group methods and written questionnaire items related to family and parent literacy were piloted for this study. Both seemed effective in gathering information. However, workplace literacy classes are small and the number of learners with children at the pilot sites was even smaller. For most items, these small numbers precluded meaningful statistical analysis of workplace literacy impact on parent literacy practices. These measures are likely to be of more use for special programs which focus upon the workplace/family connection or for much larger groups.

Employer-Gathered Productivity Indicators

Though previous studies have discussed the need for assessing productivity impacts of workplace literacy programs, few have tried to do so. This pilot assessment attempted to use some of the indicators of productivity suggested in discussion sections of studies in the research literature (i.e. attendance, accident reports, useful productivity suggestions made by employees, etc.). The pilot revealed that it is possible to gather such data with a minimum of effort on the part of employers. It also revealed that the information is not of great use if sample sizes are small and time between assessments is not very long. If a class and control group are comprised of only 15 individuals each, the impact upon absences of a single individual with the flu can overpower all other factors. This would be less likely to occur with much larger groups where influences of sickness would be more likely to balance out. Similarly, safety is an important indicator of productivity and many workplace literacy programs address safety. Accidents among a group of 15 people during a 6 month period are usually rare, however, and therefore not likely to be of much use in determining program impact. This same pattern held for productivity suggestions and discipline measures as possible indicators of program impact. Neither employer maintained data on individual employee productivity, so those measures were not available. Such indicators

are likely to be of worth when available.

Supervisor Ratings

Specially constructed supervisor ratings of employee productivity with literacy and communication behaviors on the job were of greater use. Discussions with supervisors and top employees were able to identify the types of literacy, problem solving, and communication considered important on particular jobs. A careful process of developing and revising scales to reflect these discussions is available in Chapter 6 (see also Appendix G.) At the Cumberland plant, supervisor ratings proved to be useful in noting employee improvements on the job. The ratings were less successful at Delco.

The reasons for this lack of success at Delco bear some examination. Delco supervisors generally had less education than the Cumberland supervisors and were less familiar with the concept of individual employee evaluation. Individual appointments to have researchers meet with supervisors to rate learners' job performance were cancelled for several legitimate reasons. As a result, supervisors sometimes rated employees without someone to remind them to think carefully about each scale. The resulting ratings seemed to reflect a desire to complete the task rapidly (e.g. many workers received exactly the same rating on each scale). It seems advisable in the future to require that supervisors make ratings with a researcher asking the questions and encouraging careful consideration of each scale and each worker.

Supervisor ratings were possible at the two pilot sites because learners came from highly similar jobs. Programs that draw into classes learners from several different jobs may not be able to use supervisor ratings to assess impact on productivity. Unless jobs have several common tasks, it will not be possible to construct scales which can be used by all learners. If several different scales need to be constructed for several different jobs, the small number of learners in each job category is likely to preclude any meaningful statistical analysis.

Learner questionnaire items related to literacy and communication practice on the job were of some use in gaining a picture of impact on productivity. These items are subject to some of the same limitations as supervisor ratings. At the two pilot sites, the expectation was for all workers to become involved in team meetings. For this reason, it was possible to have several questionnaire items related to such meetings. A workplace literacy program without such workplace commonalties would not be able to benefit from these questionnaire items.

CONCLUSION

This study has shown the feasibility of using a detailed impact assessment model with workplace literacy programs. Without requiring a large commitment of resources, it is possible to gather a great deal of information on learners' own literacy, the literacy of their families, and their job productivity.

The results of the study indicate what can be expected of effective workplace literacy programs. Instruction has produced some improvement in all of the areas assessed, but gains appear to be limited to areas directly addressed in class. There is apparently no transfer of learning into areas not covered by instruction. Because of this, it appears that program providers need to have clear goals for what they want to achieve in the limited time that learners are in class. They should also be seeking ways to extend this time beyond the classroom. One way of doing this is to use on-the-job materials in class so that learners will be practicing outside class time. Also, encouraging learner motivation and independence is likely to lead to learners' engaging more often in literacy-related activities.

The second phase of this study aims to determine whether the assessment model can be used by other workplace literacy programs, with a minimum of assistance from project personnel. In addition, results from this second phase will throw more light on the conclusions reached here in the pilot assessment.

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APPENDIX A

Interview Form

and

Instructions for Custom Designing

Interview

What modifications are needed?

The Interview protocol that follows addresses learners' beliefs, practices, processes and plans related to literacy activities. Most programs can use the supplied questions concerning:

- **beliefs**
- **practices**
- **plans**

without any modifications.

For the **process** section, job-specific modifications are required to determine how well employees read material from a particular workplace. This involves selection of reading materials which are key to performance at that workplace. These will be used to develop three job reading scenarios. We recommend that you select:

- prose material (e.g., a newsletter article)
- a graph (e.g., a key graph or chart)
- a procedure (e.g., an instruction sheet or job aid)

Guidelines below provide directions for developing process, factual, inference and application questions for each job reading scenario.

INTERVIEW

Personal Information:

Name: _____Date:_____

What class are you in? _____

Job you do _____

I'd like to ask you some questions about reading, writing, and education. The answers to these questions will give us an idea of the way reading and writing are used here.

Beliefs

1. Describe someone you know who is good at reading and writing. What makes you choose this person?

2. How good do you consider yourself to be at reading and writing? What makes you think so?

3. Describe how you would like to be in terms of reading and writing. (*Probe* : Could you give me some examples?)

Practices

1. Tell me the sorts of things you read and write away from work during a normal week.
   (*For probe, ask:* "Can you give me more examples?")

2. Tell me the sorts of things you read and write on the job during a normal week.
   (*Use probe above for more examples.*)

Instructions for Custom-Designing

Process: article, graph, and procedure/job aid

(For Interview, following pages)

INSTRUCTIONS

This approach reveals far more than standardized tests about an interviewee's thinking processes while reading and how those thinking processes apply to job- related reading.

A. You need to find materials key to your workplace for the scenarios. A typical mix is:
- an article,
- a graph, and
- an instruction sheet.

B. For each of these, ask 7 questions:

- 1 process question - what is going on in the interviewee's mind. (Use those in our examples.)
- 2 factual questions- based strictly on the material.
- 2 inferences questions - deductions from the material that do not rely on a great deal of background knowledge.
- 2 application questions - relating information from the material to the interviewee's background knowledge (e.g.: the employee's job).

C. Include a range of difficulty in your questions, finishing with an open-ended question which allows the interviewee to contribute.

Process: Article Example

Competitor Close Up

1. I am going to show you a newspaper article about your industry. Explain to me how you would read this story in order to find out what the writer thinks.
(*Show attached story:* "**Competitor Close Up**").
Describe what you would look at. What would you be thinking about? How would you go about reading this story? What would you do first, then next, then next?

2. (easy factual question)
How many employees does ASMO have in Statesville?
(Answer: 400. *Listed in article.*)

3. (harder factual question)
What is the only company that does not mention customers?
(Answer: BG Automotive Motors, Inc. *Requires the interviewee to look at all "customers" in the article.*)

4. (easy inference question)
From the information provided about products, what do <u>all four companies</u> have in common?
(Answer: All of them make some sort of motor. *Requires the interviewee to search for commonalities not readily apparent.*)

Process: Article Example (cont.)

5. (harder inference question)
Which of the companies listed is closely related to Japan and why do you think so?
(Answer: ASMO or Jideco. Each has Japanese plants listed and each sells to many Japanese affiliates and main customers. *Requires looking at two pieces of information and drawing deductions based on what is provided.*)

6. (harder application question)
What company makes products closest to your job at this facility? Why do you say so?
(Answer: Relate a product on the list to what the employee makes. *Requires the employee to sort through the information and then to apply it to his/her background knowledge.*)

7. (easy application question to end the section)
From this list, which company pays the least amount to its workers? How does this relate to your wages at Delco?
(Answer: ASMO. It's more or it's less than what I get paid here. *Requires the employee to apply the information to his/her background knowledge, but allows him/her to contribute more.*)

Competitor Close-Up: A Year in Review

Throughout the year, the **Delco Doings** has brought you profiles on the companies trying to take a bite out of our business and our profits. Sometimes there were success stories, when Rochester Operations met the challenge and came out on top. Other times we had to face the fact that there are companies in Asia, Europe, and right here at home that are reaching the market better, faster or with lower prices.

Here's a quick recap of the competitors we've covered this year.

ASMO, Inc.
Location: Battle Creek, Michigan; Statesville, North Carolina; Kosai City, Japan.
Affiliate: Nippondeso
Products: wiper systems, windshield washer systems, power window lifts, antennas, retractable and blower motors.
Main Customers: Nippondeso, Ford, Chrysler, General Motors, and every Japanese transplant except Nissan.
Number of Employees: Battle Creek, 130; Statesville, 400.
Total Wage and Benefit Cost/Hour: $9.58

Jideco
Location: Bardstown, Kentucky;Yokohama City, Japan; Nine production facilities throughout Japan
Affiliates: Hitachi (24%), Nissan (21%)
Products: wipers, transmissions, reservoirs arms and blades, wiper motors, and others. Control-- wiper switches and others. Motors -- power seat sliders, power window, door lock, blower and engine cooling motors and others.
Accessories: air compressors, power window kits, door locks, rain-sensing intermittent wiper controls and others.
Main Customers: Nissan, Isuzu, Honda, Mitsubishi, Mazda, and Suzuki.
Number of Employees: Bardstown, 60 in 1987
Total Wage and Benefit Cost/Hour: $10.27

Power Motion
Location: Two plants in London, Ontario
Parent: Siemans Automotive of West Germany
Products: air moving motors (5,250 armatures a day)
Main Customer: GM of US & Canada
Number of Employees: 200 at main facility in London, Ontario
Total Wage and Benefit Cost/Hour: $11.50 (U.S. equivalent)

BG Automotive Motors, Inc.
Location: Hendersonville, TN.
Parents: Bosch Corporation and General Electric Company
Products: 20 different small motors including: engine cooling, modular wipers, door lock, seat back, head rest, sun-roof, washer pump, head lamp, power window.
Number of Employees: 275
Total Wage and Benefit Cost/Hour: Unknown at this time.

Every day another company steps into the automotive arena ready to try to take away our customers. Rochester Operations has an extensive communication network to keep employees informed about our competitors and what we're doing to stay ahead. Look to **Delco Doings** to give you the information you need to help keep Rochester Operations competitive in the '90s.

From: **Delco Doings**, December/January, 1991, p.2.

Process: Graph Example

Production Problems

1. I am going to show you a graph. Explain to me how you would read this graph in order to find out what it's about.
(*Show attached graph.*" **Production Problems**").
Describe what you would look at. What would you be thinking about? How would you go about reading this graph? What would you do first, then next, then next?

2. (easy factual question)
What is the total number of culls?
(Answer: 149. *Shown at top of graph.*)

3. (harder factual question)
What time period is covered in this chart?
(Answer: one week or week one in May. *Shown at top of graph in abbreviated form.*)

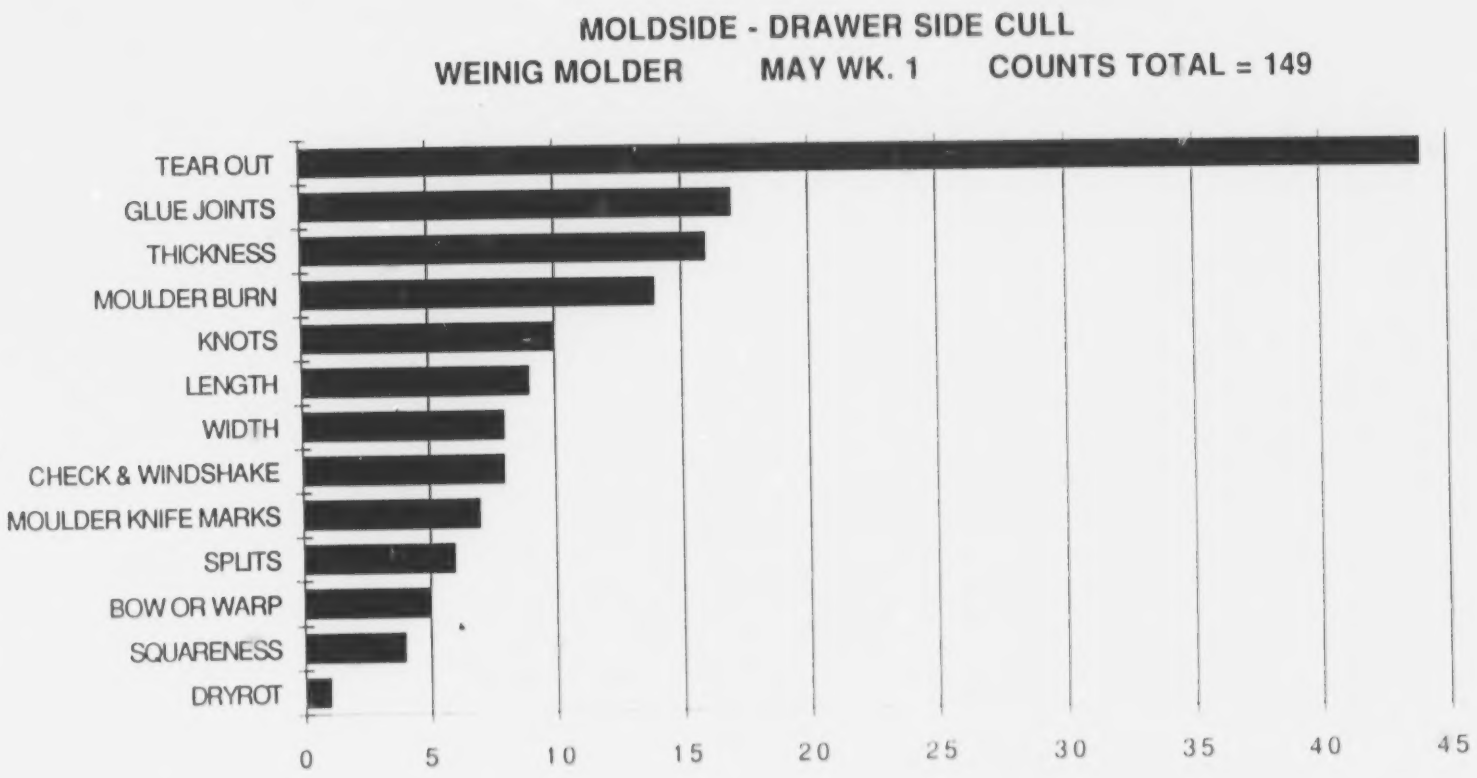
4. (easy inference)
What is the biggest problem here?
(Answer: tear outs. *Longest bar on graph.*)

Process: Graph Example (cont.)

5. (harder inference)
Find 3 types of problem involving measurement.
(Possible answers: thickness, length, width, squareness. *Requires selection from list at left of graph.*)

6. (easy application question)
Pick one problem and suggest at least one cause for that problem.
(Possible answers: For example, tear outs are caused when the wood gets caught in the machine and is gouged; moulder burn is caused by wood getting caught in the machine and being burned. *Uses interviewee's job-related knowledge.*)

7. (more difficult application question)
Pick a second problem and suggest both a cause and a solution for the problem.
(Possible answers: tear outs, caused when the wood gets caught in the machine and is gouged, can be repaired with wood filler and sanding; or moulder knife marks can be caused by gouging of the wood in carving it and can be repaired if you can get at the gouge and sand it and provided the finish hasn't already been applied. *Uses interviewee's job-related knowledge in more depth.*)


MOLDSIDE - DRAWER SIDE CULL
WEINIG MOLDER MAY WK. 1 COUNTS TOTAL = 149
TEAR OUT
GLUE JOINTS
THICKNESS
MOULDER BURN
KNOTS
LENGTH
WIDTH
CHECK & WINDSHAKE
MOULDER KNIFE MARKS
SPLITS
BOW OR WARP
SQUARENESS
DRYROT
0
5
10
15
20
25
30
35
40
45

Process: Procedure/Job Aid Example

OSHA CARD

1. The government has safety regulations and special labels in many workplaces. I am going to show you a safety card that many employees in America must keep in their pockets while working. This card shows how to understand safety labels. Explain to me how you would read this card.
(*Show attached card*, "**OSHA** ").

   Describe what you would look at. What would you be thinking about? How would you go about reading this card? What would you do first, then next, then next?

2 (easy factual question)
What should you do when you see the letter "x"?
(Answer: Ask my supervisor. *Directly explained in the text*)

3. (harder factual question)
What do all the symbols in "k" represent?
(Answer: airline hood or mask, gloves, a suit and boots.
Answers are in the text, but are more difficult to find.)

4. (easy inference)
What is the most common type of protection from "A" to "K"?
(Answer: gloves. *Requires the interviewee to look through several parts of the text and then to generalize the information*)

Process: Procedure/Job Aid Example (cont.)

5. (harder inference)
Name all the letters which refer to severe hazards. How did you tell this?
(Answer: F, H, J, K. Top of the table says "4 severe hazard: 4 probably means 4 pictures. These letters have 4 pictures. *Requires the interviewee to make deductions between different parts of the card.*)

6. (harder application)
If a supervisor says you are about to do a job that requires sanding, which protective items would you choose?
(Answer: safety glasses and a dust respirator. Optional: gloves, combination dust/vapor respirator and a face shield. *Requires the interviewee to interpret the information on the card and to relate it to a real-life situation.*)

7. (easy application question to end the section)
Give me two examples of how you or someone you know could use this card.
(Answer: Must give 2 examples and list protections. *This is more open-ended and allows the interviewee to contribute based on his/her job background..*)

Hazardous Materials Identification System

HAZARD INDEX

4 Severe Hazard
3 Serious Hazard
2 Moderate Hazard
1 Slight Hazard

0 Minimal Hazard

* An asterisk (*) or other designation corresponds to additional information on a data sheet or separate chronic effects notification.

PERSONAL PROTECTION INDEX

A

B

C

D

E

F

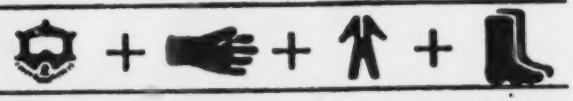
AMERICAN LABELMARK, Chicago, IL 60646 NC-EC

G

H

I

J

K 

X Ask your supervisor for specialized handling directions

1981 National Paint & Coatings Association

Plans

Now I'd like to ask you about your plans. Explain how you see reading and education as part of these plans:

A. What are your plans for the next year?

B. What are your plans for the next 5 Years?

C. What are your plans for the next 10 Years?

APPENDIX B

Questionnaire Form

and

Instructions for Custom Designing

Questionnaire

What modifications are needed?

The Questionnaire protocol that follows addresses learners' reading abilities, their literacy practices at work and away from work, and the literacy activities of their families. Most programs can use the supplied questions concerning:

- **literacy away from work**
- **literacy at work**
- **family literacy**

without any modifications.

The section on **self-rating of reading ability** has 15 questions, 10 of which should apply to most industries and thus need no changes. However, the last 5 items should be site-specific reading materials, such as warning labels, route sheets, product lists, etc. Actual names may differ from site to site.

When you choose these last 5 items, select a mix of:

- prose and graphic materials (e.g., a note from a supervisor, and a blueprint)
- easy and difficult reading materials (e.g., simple suggestion forms and more complex benefit information)

QUESTIONNAIRE

Name: _____ Age: _____ Sex: _____

Education: ___ (furthest year in school) Training _____

Marriage Status: _____

Children: (number) _____ (ages) _____

Practices: Self rating reading ability

I. 1. First check only the things you've read in the past month.

2. Now go back and rate your ability to read the items you've checked.

		poor				excellent
__	local newspapers	1	2	3	4	5
__	classified ads	1	2	3	4	5
__	telephone bills	1	2	3	4	5
__	TV guide listings	1	2	3	4	5
__	magazines	1	2	3	4	5

		poor				excellent
__	training guides	1	2	3	4	5
__	paycheck stubs	1	2	3	4	5
__	company newsletters	1	2	3	4	5
__	benefit information	1	2	3	4	5
__	graphs and charts	1	2	3	4	5

		poor				excellent
__	_____	1	2	3	4	5
__	_____	1	2	3	4	5
__	_____	1	2	3	4	5
__	_____	1	2	3	4	5
__	_____	1	2	3	4	5

135

Instructions for Custom-Designing

Practices: Self rating reading ability

(For Questionnaire, preceding page)

INSTRUCTIONS

1. This component includes ten standard items followed by five examples of site specific items.
2. In the site specific section, replace example items with items key to your workplace.
3. Have a mixture of prose and document/ chart items.
4. These should cover a range of reading difficulties.
5. Possible sources of materials:
   - warning labels,
   - production quotas,
   - parts lists,
   - product lists
   - department inventories.

EXAMPLE:

	poor				excellent
blueprints	1	2	3	4	5
route sheets	1	2	3	4	5
notes from supervisor	1	2	3	4	5
suggestion forms	1	2	3	4	5
inventory graphs	1	2	3	4	5

Practices: Reading frequency

Please *check* the number of times you have done the following:

1. **In the last 7 days** how many times have you used a TV guide listing to select programs?

0 1 2 3 4 5 6 7 8 9 10+

2. In the last 7 days how many times have you read a newpaper?

0 1 2 3 4 5 6 7 8 9 10+

3. In the last 7 days how many times have you read a magazine?

0 1 2 3 4 5 6 7 8 9 10+

4. In the last 7 days how many times have you read a book for pleasure?

0 1 2 3 4 5 6 7 8 9 10+

5. In the last 7 days how many times have you read the following types of books?

mystery:	__ times	how-to books:	__ times
novels:	__ times	factual books:	__ times
poetry:	__ times	encyclopedia:	__ times
Bible:	__ times	comic books:	__ times
other types:	_____	__ times	
	_____	__ times	

Practices: Reading frequency (cont.)

6. How often do you make a shopping list before you go to the store?
___ never ___ occasionally ___ often ___ always

7. When you're waiting in an office, how often do you read magazines?
___ never ___ occasionally ___ often ___ always

8. Do you subscribe to any magazines? ___ yes ___ no

If yes, which ones?

_____

9. How many different magazine titles do you have in your home?

_____
0 1 2 3 4 5 6 7 8 9 10+

10. How many books are in your home, either owned or borrowed?

_____
0 10 20 30 40 50 60 70 80 90 100+

Practices: Literacy at work

Please circle the number which best describes you in the situations below:

(1) You just listen in team or department meeting discussions.

very like me 1 2 3 4 5 very unlike me

(2) You talk a lot in team or department meetings, asking questions or sharing ideas.

very like me 1 2 3 4 5 very unlike me

(3) Your ideas are often discussed in team or department meetings.

very like me 1 2 3 4 5 very unlike me

(4) You wait for others to talk about written information, just to be sure what is in it.

very like me 1 2 3 4 5 very unlike me

(5) You look for printed directions to help figure out what to do when a problem arises.

very like me 1 2 3 4 5 very unlike me

(6) You often have trouble reading paperwork from management.

very like me 1 2 3 4 5 very unlike me

(7) When the booklet about new health benefits arrived, you read it carefully.

very like me 1 2 3 4 5 very unlike me

Practices: Family Literacy

Only answer the following questions if you have a child between the ages of 3-17 at home.

Please answer for your youngest child in this age group and please fill in only one answer per question:

1. This child is ____ years old.

2. **In the last 7 days** how many times has your child looked at or read books or magazines?

   0 1 2 3 4 5 6 7 8 9 10+

3. In the last 7 days how many times has your child seen you reading or writing?

   0 1 2 3 4 5 6 7 8 9 10+

4. In the last 7 days how many times have you helped your child with homework and/or with school projects?

   0 1 2 3 4 5 6 7 8 9 10+

5. In the last 7 days how many times have you read/looked at books with your child or listened to him/her read?

   0 1 2 3 4 5 6 7 8 9 10+

6. In the last 7 days how many times has your child asked to be read to?

   0 1 2 3 4 5 6 7 8 9 10+

7. In the last 7 days how many times has your child printed, made letters, or written?

   0 1 2 3 4 5 6 7 8 9 10+

Practices: Family Literacy (cont.)

8. **In the last month** how many times has your child gone to a public library?

0 1 2 3 4 5 6 7 8 9 10+

9. In the last month how many times have you participated/helped out in your child's school?

0 1 2 3 4 5 6 7 8 9 10+

10. In the last month how many times have you hung up or displayed your child's reading and writing efforts?

0 1 2 3 4 5 6 7 8 9 10+

11. In the last month how many times have you bought or borrowed books for your child?

0 1 2 3 4 5 6 7 8 9 10+

12. (Please check only one.)
I expect my child to finish at least:

_6th grade _9th grade _high school
_two-year college _4-year college or more

APPENDIX C

Cloze Test Samples

and

Instructions for Custom Designing

Cloze Exercise

The cloze procedure is based on the psychological principle of closure, which is the human tendency to recognize and complete a pattern or sequence. It involves replacing missing words in a reading passage. This procedure can assess the ability of employees to comprehend the passage. Cloze test scores correlate very highly with standardized reading test scores. Cloze tests can be made from local workplace materials.

CLOZE PROCEDURE

1. Select a job relevant passage of 150-200 words.

2. Leave the first and last sentences intact.

3. Starting with the second sentence, omit every fifth word. This will give about 25 blanks. Replace all omitted words with the same sized blank line, 13-15 spaces is typical.

4. Employees are to read the passage and to fill the blanks with their best guess at the word removed.

5. Instructions for the cloze test should suggest employees read the entire text before attempting to fill in the blanks and should encourage employees to answer all questions even if they have to guess. It is rare for anyone to know more than 50% of the blanks.

6. Avoid controversial or emotional topics, and topics requiring technical knowledge. Scores for such materials are less valid.

Name _____ Date _____

CLOZE Exercise

In a cloze exercise, you try to guess which words are missing. For example, in the sentence below, a word is missing.

She looked before she _____ the street.
A good guess for the missing word is "crossed."
She looked before she *crossed* the street.

In the story below, try to guess and replace the missing words. Don't expect to get them all. Some are nearly impossible.

G.M Designs Safety for All Ages

We all like to think about the old days. Life seemed simpler and, in some ways, better then. But when it comes to _____, the good old days _____ offer the same degree _____ safety as today's cars _____ trucks. Advancements in technology _____ the G.M. vehicle you _____ today among the safest _____ the world. Each G.M. _____ and truck is backed _____ thousands of dedicated men _____ women who care about _____ safety of their customers. _____, as G.M. customers themselves, _____ have a stake in _____ G.M. vehicles the highest _____ quality and reliability.

And _____ you're wondering if safety _____ improved in recent years, _____ this: The classic 1955 _____ would require more than _____ major changes or additions _____ hundreds of incremental changes _____ be as safe as _____ vehicles.

From: Kilborn, C. GM Today (November/December, 1990), page 1.

Cloze Exercise Answer Key

G.M Designs Safety for All Ages

We all like to think about the old days. Life seemed simpler and, in some ways, better then. But when it comes to *automobiles*, the good old days *didn't* offer the same degree *of* safety as today's cars *and* trucks. Advancements in technology *make* the G.M. vehicle you *purchase* today among the safest *in* the world. Each G.M. *car* and truck is backed *by* thousands of dedicated men *and* women who care about *the* safety of their customers. *And*, as G.M. customers themselves, *they* have a stake in *making* G.M. vehicles the highest *in* quality and reliability.

And *if* you're wondering if safety *has* improved in recent years, *consider* this: The classic 1955 *Chevrolet* would require more than *60* major changes or additions *and* hundreds of incremental changes *to* be as safe as *today's* vehicles.

Name or ID#_____ Date _____

CLOZE Exercise

In a cloze exercise, you try to guess which words are missing. For example, in the sentence below, a word is missing.

She looked before she _____ the street.

A good guess for the missing word is "crossed."

She looked before she *crossed* the street.

In the story below, try to guess and replace the missing words. Don't expect to get them all. Some are nearly impossible.

Two more teams on the self-directed journey

Our workplace is taking on more change daily. So are the skills that all our employees must have in order to change with it. It is getting to be _____ essential each day that _____ skill gaps be filled _____ our small business can _____ a source of competitive _____ .

The changes all companies _____ expect over the next _____ -- a shrinking labor force, _____ demand for workers in _____ jobs, and increasingly competitive _____ markets -- will require businesses _____ all sizes to strengthen _____ employee skills and training _____

We believe that our _____ firm can remain competitive _____ the large firm by _____ a more flexible training _____ education program. We hope _____ be better than the _____ firm in adapting an _____ previous training experiences to _____ company's needs.

Two more _____ are now involved in self-directed _____ team training. They are _____ Green Team and the _____ Team. They join the Orange Team, which completed their sessions last year.

Cloze Exercise Answer Key

Two more teams on the self-directed journey

Our workplace is taking on more change daily. So are the skills that all our employees must have in order to change with it. It is getting to be ___more___ essential each day that ___the___ skill gaps be filled ___so___ our small business can ___remain___ a source of competitive ___strength___.

The changes all companies ___can___ expect over the next ___decade___ -- a shrinking labor force, ___more___ demand for workers in ___technical___ jobs, and increasingly competitive ___world___ markets -- will require businesses ___of___ all sizes to strengthen ___their___ employee skills and training ___programs___.

We believe that our ___small___ firm can remain competitive ___with___ the large firm by ___having___ a more flexible training ___and___ education program. We hope ___to___ be better than the ___large___ firm in adapting an ___employee's___ previous training experiences to ___the___ company's needs.

Two more ___teams___ are now involved in self-directed ___work___ team training. They are ___the___ Green Team and the ___White___ Team. They join the Orange Team, which completed their sessions last year.

Name or ID#_____ Date _____

CLOZE Exercise

In a cloze exercise, you try to guess which words are missing. For example, in the sentence below, a word is missing.

She looked before she _____ the street.

A good guess for the missing word is "crossed."

She looked before she *crossed* the street.

In the writing below, try to guess and replace the missing words. Don't expect to get them all. Some are nearly impossible.

Cumberland Safety Rules

1. For your welfare, all injuries, no matter how slight, incurred on Company premises must be reported immediately to your supervisor. The services of a physician _____ available and will be _____ as required. Failure to _____ such injuries may cause _____ difficulties and could affect _____ Workingmen's Compensation benefits.

2. Wear _____ and shoes suitable to _____ work. Open toed or _____ top shoes are not _____ . Shorts are not permitted. _____ are required.

3. Dust your _____ only with an air _____ equipped with an air _____ nozzle.

4. Keep fire equipment _____ its proper place and _____ all fire rules.

5. Learn _____ lift properly. Keep your _____straight and use your _____ to avoid strain.

6. All _____ guards should be kept _____ place. Unsafe machine guards _____ be reported to your _____ at once. No guard _____ be removed without the _____ of your supervisor.

7. Do _____ repair machinery when it _____ in operation. Stop it and fix the switch so that it cannot be accidently turned on.

Cloze Exercise Answer Key

Cumberland Safety Rules

1. For your welfare, all injuries, no matter how slight, incurred on Company premises must be reported immediately to your supervisor. The services of a physician *are* available and will be *obtained* as required. Failure to *report* such injuries may cause *medical* difficulties and could affect *your* Workingmen's Compensation benefits.

2. Wear *clothing* and shoes suitable to *your* work. Open toed or *canvas* top shoes are not *permitted*. Shorts are not permitted. *Shirts* are required.

3. Dust your *clothes* only with an air *hose* equipped with an air *restricting* nozzle.

4. Keep fire equipment *in* is proper place and *obey* all fire rules.

5. Learn *to* lift properly. Keep your *back* straight and use your *legs* to avoid strain.

6. All *machine* guards should be kept *in* place. Unsafe machine guards *should* be reported to your *supervisor* at once. No guard *should* be removed without the *permission* of your supervisor.

7. Do *not* repair machinery when it *is* in operation. Stop it and fix the switch so that it cannot be accidently turned on.

APPENDIX D

Family Literacy
Focus Group Interview

Family Literacy Focus Group Interview

This interview form is designed to be used with a group of learners as the basis for a discussion about family literacy. It has been found that the comments of one member of the group will stimulate the thoughts of others, producing a wider range of ideas than will individual interviews.

Family Literacy Focus Group Interview

1. Why do you think some children learn to read and write well in school and others don't?

2. Do you think there is anything parents might do to help their children learn to read and write better?

3. Do you keep any reading or writing materials at home? (i.e., letter blocks, flashcards, paper, pens, chalkboard, books, magazines, comics, cassettes with books, encyclopedia, dictionary, newspapers, etc)

4. Do you do any reading or writing activities with your children? (i.e., visit library, hear stories, read to them, watch educational television, look at magazines or books with children, point out words to them, play school, show them how to read or write, etc)

5. At home, do your children see you doing any reading or writing? (i.e. books, magazines, papers, recipes, directions, letters, lists, notes, etc.)

6. What activities are you involved in at your child's school? (i.e., parent/teacher meetings, school fund-raisers, committees, notes or letters, informal talks when collecting child, assist in classroom, help child read at home, etc)

7. Have you begun anything new related to reading and writing since you started classes here?

a. Materials

b. Activities

c. Modelling

d. School

APPENDIX E

Classroom Observation Form

Classroom Observation Form

The classroom observation form serves as a guide for recording notes about the activities actually occurring in the classroom. It is divided into columns reflecting the time in five minute intervals, the actual activities of both teacher and student, and comments about the overall class. The form suggests items the observer might wish to note.

Classroom Observation

Time	Student Activity	Teacher Activity	Comments
0			
05			
10			
15			
20			
25			
30			
35			
40			
45			
50			
55			

Make note of time spent by students actually reading or doing things. Also note time learners spend listening to the instructor. When learners are in small groups or working individually should be mentioned. Special note should be made when the instructor or a student demonstrates how to do something.

APPENDIX F

ESL Checklist

ESL Checklist

The ESL checklist is designed for teachers to reflect upon the level of competence each student is demonstrating. Teachers will be able to note individual areas of strength and weakness. This form is helpful both in planning instruction and in suggesting areas for the student to practice on outside of the workplace.

ESL Benchmarks and Ratings*

Learner Name_____ Teacher Name _____

Date of Rating _____

For each item, rate the learner:

3 = can do this as well or nearly as well as a native speaker
2 = can usually manage to do this, but sometimes has trouble
1 = can only sometimes manage to do this adequately
0 = cannot do this

Beginner Level

_____ Briefly describes feelings about work

_____ Briefly describes feelings about other life areas

_____ Follows simple directions

_____ Asks for clarification if something is not understood

_____ Reads alphabet in English

Word recognition:

_____ has access to dictionary/understands dictionary use

_____ uses dictionary

_____ uses roots, prefix, suffix

_____ uses context

_____ Looks up simple information (phone book, dictionary)

_____ Reads simple signs

_____ Begins short journal entries

* Modified from Bronstein, E. (1991) Benchmarks and student learning profile for the workplace ESL program of the Labor Education Center at Southeastern Mass. University

Intermediate Level

Oral

_____ Discusses feelings about work with some elaboration

_____ Discusses feelings about other life areas with some elaboration

_____ Gives/follows instructions at work

_____ Gives/follows instructions in other life areas

_____ Asks for clarification if something is not understood

_____ Discusses industrial specific diseases/illnesses

_____ Describes/reports dangerous conditions

_____ Offers suggestions to supervisor

Reading

_____ Uses dictionary (_____ bilingual _____ English-English)

_____ Locates own reading material in newspapers

_____ Understands literal level of text

_____ Infers information not explicitly stated

_____ Draws conclusions from reading

Writing

_____ Fills out more complex forms

_____ job application _____ social security _____ insurance

_____ other application forms (library card, courtesy card, credit card)

_____ Writes short notes/memos (_____ at work
_____ out of work)

_____ Writes journal entries (dialogue journal)

_____ Uses correct punctuation

Advanced Level

Oral

_____ Discusses feelings with more elaboration

_____ Asks for clarification if something is not understood

_____ Gives/follows more complex directions

_____ Understands and can discuss basic worker rights

_____ Understands and can discuss key contract sections

Reading

_____ Uses index/table of contents

_____ Locates own reading material in newspaper

_____ Locates own reading material in encyclopedia or other reference

_____ Reads short pieces in newspaper and simple magazines

_____ Reads short pieces in flyers, notices, factsheets

_____ Reads short self-selected material at home

_____ Reads longer pieces in books or longer articles

Writing

_____ Fills out more complex forms

_____ job application _____ social security _____ insurance

_____ other application forms (library card, courtesy card, credit card)

_____ Writes short notes/memos (_____ at work
_____ out of work)

_____ Observes differences in tone/register between formal and informal writing

_____ Writes longer journal entries/responds to entries

APPENDIX G

Supervisor Rating Scales
Examples and Instructions

Developing Supervisor Ratings

It is best to develop ratings of employee job performance together with supervisors and possibly key employees.

1. First ask supervisors to describe how top performers use information on the job.

Encourage them to think of specific workers who are top performers. A supervisor might say, for example, that a top performer reads charts and responds with his own analysis, or sets machines correctly and checks settings thoroughly, or completes all job-related paperwork and tries to improve procedures. Continue to probe until you feel reasonably satisfied you have a complete list. From this list, you can identify important areas (i.e. communication, problem solving, paperwork, etc.)

Next ask supervisors to go through a three-step process in fleshing out these areas. The order of these steps is important.

2. Ask supervisors to:

a. describe the behavior of the top performers first;

b. then, describe the behavior of the bottom performers;

c. last, describe the average performer.

These behaviors will be used to provide descriptions and anchors for ratings. In relation to paperwork, for example, supervisors might agree on the following descriptions:

Top: completes all job-related paperwork and tries to improve procedures;

Bottom: intimidated by job-related paperwork and does it poorly;

Average: does job-related paperwork but simply keeps pace.

As supervisors develop these descriptions, new areas and categories may emerge. The supervisors may give examples related to problem-solving or to machine setting, or some other area. These may later become additional rating scales.

3. Once the descriptions of top, bottom, and average performances are completed, work with supervisors to develop acceptable labels for the categories.

For example, labels might include items like machine setting, paperwork, communication, responsibility, and problem-solving.

4. After this discussion, you will draft a rating scale and submit it to the supervisors for comment and possible revision. Sometimes during revision, complex scales split to become two separate scales.

Examples of scales appear on the following pages.

Employee Assessment - Overall Rating

Please rate each employee on a scale of 1 - 10 for each aspect below.

- An average employee would be rated 5.
- A top employee would be rated 8 or higher.
- A bottom employee would be rated 2 or lower.

EMPLOYEE _____ **DATE** _____

RATER _____

COMMUNICATION

Bottom	**Average**	**Top**
won't speak; can't express self; nervous; won't shake hands	open, relaxed communicator; good listener and responder	processes information and responds with own analysis

---

1 2 3 4 5 6 7 8 9 10

CONCERNS, PROBLEM-SOLVING

Bottom	**Average**	**Top**
doesn't consider alternative solutions; makes irrelevant suggestions; never thinks of consequences	can suggest solutions, but not work through them in detail	suggests solutions and analyses consequences, including a timeline

---

1 2 3 4 5 6 7 8 9 10

HANDLING CONFLICT

Bottom	Average	Top
antagonistic; turns back on others; makes abrupt denials and impolite comments	cooperates with others most of the time, but some antagonism	empathetic; cooperative; consistent attitude

1 2 3 4 5 6 7 8 9 10

SELF-ESTEEM

Bottom	Average	Top
shy; uncertain; overwhelmed by life's problems	some confidence in self; but life not really under control	confident; usually in control of life and of most situations

1 2 3 4 5 6 7 8 9 10

SETTING GOALS

Bottom	Average	Top
unable to plan ahead and set goals	some short-term planning and goal setting	clear plans for future; definite, reachable goals

1 2 3 4 5 6 7 8 9 10

COMMITMENT

Bottom	Average	Top
lacks motivation; no interest in company goals	some commitment; but just doing a competent job	conscientious; committed to company goals

1 2 3 4 5 6 7 8 9 10

RESPONSIBILITY

Bottom	Average	Top
has to be told what to do and checked on	can be left to carry out routine work	dependable; takes responsibility for own work

1 2 3 4 5 6 7 8 9 10

INITIATIVE

Bottom	Average	Top
ignores machine errors and lets them build up	realizes machine errors and attempts immediate solution only	monitors machine errors and deals with them through the team

1 2 3 4 5 6 7 8 9 10

PAPERWORK

Bottom	Average	Top
intimidated by job-related paperwork and does it poorly	does job-related paperwork, simply keeping pace	completes all job-related paperwork and tries to improve procedures

1 2 3 4 5 6 7 8 9 10

MACHINE SETTING

Bottom	Average	Top
unable to set machines correctly	usually sets machines correctly, but doesn't always check settings	sets machines correctly and checks settings thoroughly

1 2 3 4 5 6 7 8 9 10

APPENDIX H

Tabular Data

Glossary of Variables

In the tables that follow, the variables are given brief descriptions which may not always be entirely clear. So this glossary provides a fuller explanation for those variables that require it.

BELIEFS AND PLANS	
Literacy self-rating	Learner self-rating of literacy level (on scale 1 - 5)
Change in literacy self-image	Holistic judgement of learner's change in literacy self-image (on scale -1, 0, +1)
Change in plans for 1, 5, 10 years	Holistic judgement of learner's change in plans for 1, 5, 10 years (on scale -1, 0, +1)
Change in plans for education	Holistic judgement of learner's change in plans for reading and education (on scale -1, 0, +1)
PRACTICES	
Reading/writing away from work	Count of types of reading/writing away from work in last week
Reading/writing at work	Count of types of reading/writing at work in last week
Items read (in 20 item list)	Count of items from given list read in last month
Frequency of reading activities	Sum of 6 frequency ratings of literacy activities (each on scale 1 = never to 5 = everyday)
Ownership of reading materials	Sum of book ownership and magazine subscription (on scale 1 = 1-5 to 8 = 50+)
Self-rating on talking in meetings	Learner self-rating on their participation in meetings (on scale 1 - 5)
Self-rating on ideas discussed	Learner self-rating on how much their ideas are discussed in meetings (on scale 1 - 5)
Self-rating on asking for help	Learner self-rating on how much they ask for help at work (on scale 1 - 5)
PROCESSES	
Total process responses	Count of all responses to process question
Focus responses	Count of responses to process question involving points of focus (e.g. title, bold print)
Strategy responses	Count of responses to process question involving reading strategies (e.g. skim, read through)
Topic responses	Count of responses to process question involving topics of interest (e.g. products, wages)

• In each pair of values, mean is above and standard deviation is below.

Delco: Technical Preparation Class (n = 14)

BELIEFS & PLANS	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Literacy self-rating	3.357 1.082	3.929 .829	.571 .938	p<.05
Change in literacy self-image	*(Holistic*		0.5 .65	p<.01
Change in plans for 1 year	*judgements*		0.429 .646	p<.05
Change in plans for 5 years	*of change: no pre-*		0.357 .633	p<.05
Change in plans for 10 years	*and post-*		0.0 .679	n.s.
Change in plans for education	*scores)*		- .143 .949	n.s.
PRACTICES				
Reading/writing away from work	4.786 2.082	6.571 2.709	1.786 2.86	p<.05
Reading/writing at work	2.846 1.725	2.615 2.293	- .231 3.516	n.s.
Items read (in 20 item list)	17.308 4.644	18.846 2.734	1.538 3.799	n.s.
Frequency of reading activities	16.308 3.093	16.923 3.201	.615 1.502	n.s.
Ownership of reading materials	5.154 2.035	5.154 1.951	0.0 1.354	n.s.
Self-rating on talking in meetings	2.769 1.301	3.231 1.235	.462 .776	p<.05
Self-rating on ideas discussed	2.385 1.325	3.231 1.092	.846 1.463	p<.05
Self-rating on asking for help	1.615 .768	1.615 .768	0.0 1.08	n.s.

* In each pair of values, mean is above and standard deviation is below.

Delco: Technical Preparation Class (cont.)

PROCESSES	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Total process responses	4.214 1.424	5.286 1.858	1.071 2.526	n.s.
Focus responses	1.786 1.188	1.786 1.251	0.0 .961	n.s.
Strategy responses	1.143 .864	1.357 .842	.214 1.051	n.s.
Topic responses	1.286 1.437	2.143 1.748	.857 2.143	n.s.
Article question (easy factual)	.929 .267	1.0 0.0	.071 .267	n.s.
Article question (harder factual)	1.5 .519	1.714 .469	.214 .426	p<.05
Graph question (easy factual)	4.857 .363	4.857 .363	0.0 .392	n.s.
Graph question (easy factual)	4.571 .756	4.643 .633	.071 .917	n.s.
Graph question (harder factual)	4.071 1.207	3.714 1.139	- .357 1.008	n.s.
Graph question (inference)	2.071 1.072	2.786 .893	.714 .994	p<.01
Job aid question (easy factual)	.929 .267	1.0 0.0	.071 .267	n.s.
Job aid question (harder factual)	2.429 .646	2.643 .497	.214 .893	n.s.
Job aid question (inference)	2.643 .745	2.857 .535	.214 .975	n.s.
Cloze test score	10.857 2.685	12.429 3.131	1.571 2.377	p<.05

* In each pair of values, mean is above and standard deviation is below.

Delco: Technical Preparation Control (n = 12)

BELIEFS & PLANS	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Literacy self-rating	3.583 .669	3.5 .674	- .083 .515	n.s.
Change in literacy self-image	*(Holistic*		.083 .515	n.s.
Change in plans for 1 year	*judgements*		- .167 .718	n.s.
Change in plans for 5 years	*of change: no pre-*		- .333 .492	n.s.
Change in plans for 10 years	*and post-scores)*		- .083 .515	n.s.
Change in plans for education			2.25 .866	n.s.
PRACTICES				
Reading/writing away from work	4.75 1.42	4.583 1.564	- .167 2.29	n.s.
Reading/writing at work	3.0 .853	3.083 1.832	.083 1.505	n.s.
Items read (in 20 item list)	18.75 2.34	18.583 2.644	- .167 3.81	n.s.
Frequency of reading activities	18.167 2.082	16.583 1.676	- 1.583 2.644	n.s.
Ownership of reading materials	4.917 2.019	4.833 2.038	- .083 1.165	n.s.
Self-rating on talking in meetings	3.333 1.614	3.083 1.311	- .25 2.094	n.s.
Self-rating on ideas discussed	3.5 1.314	3.25 1.055	- .25 1.138	n.s.
Self-rating on asking for help	1.667 1.231	2.25 1.485	.583 1.379	n.s.

* In each pair of values, mean is above and standard deviation is below.

Delco: Technical Preparation Control (cont.)

PROCESSES	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Total process responses	5.75 1.765	5.25 1.545	- .5 2.393	n.s.
Focus responses	1.917 .9	2.083 .9	.167 .937	n.s.
Strategy responses	1.583 1.443	1.0 .603	- .583 1.676	n.s.
Topic responses	2.25 1.712	2.167 1.801	- .083 1.676	n.s.
Article question (easy factual)	1.0 0.0	1.0 0.0	0.0 0.0	n.s.
Article question (harder factual)	1.417 .515	1.583 .515	.167 .718	n.s.
Graph question (easy factual)	4.583 .515	4.333 .651	- .25 .754	n.s.
Graph question (easy factual)	3.917 1.311	3.917 .793	0.0 1.044	n.s.
Graph question (harder factual)	2.75 1.865	3.833 .835	1.083 1.782	p<.05
Graph question (inference)	2.75 1.138	2.583 .669	- .167 1.267	n.s.
Job aid question (easy factual)	1.0 0.0	1.0 0.0	0.0 0.0	n.s.
Job aid question (harder factual)	2.917 .289	2.833 .577	- .083 .289	n.s.
Job aid question (inference)	2.583 .793	2.667 .778	.083 .289	n.s.
Cloze test score	9.583 2.843	10.417 2.968	.833 1.801	n.s.

* In each pair of values, mean is above and standard deviation is below.

Delco: GED Class (n = 15)

BELIEFS & PLANS	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Literacy self-rating	2.9 .568	2.8 .632	- .1 .568	n.s.
Change in literacy self-image	*(Holistic*		0.133 .64	n.s.
Change in plans for 1 year	*judgements*		0.0 .845	n.s.
Change in plans for 5 years	*of change: no pre-*		0.2 .561	n.s.
Change in plans for 10 years	*and post-*		0.067 .704	n.s.
Change in plans for education	*scores)*		0.067 .704	n.s.
PRACTICES				
Reading/writing away from work	3.867 1.407	4.2 1.424	.333 1.447	n.s.
Reading/writing at work	2.133 1.598	2.267 1.71	.133 1.642	n.s.
Items read (in 20 item list)	18.867 1.807	19.6 1.056	.733 1.1	p<.05
Frequency of reading activities	17.0 2.746	17.357 2.56	.357 2.62	n.s.
Ownership of reading materials	5.463 2.634	5.692 2.136	.231 1.691	n.s.
Self-rating on talking in meetings	3.0 1.464	3.267 1.58	.267 1.58	n.s.
Self-rating on ideas discussed	3.067 1.28	3.4 1.242	.333 .9	n.s.
Self-rating on asking for help	1.533 1.125	1.667 1.113	.133 1.598	n.s.

* In each pair of values, mean is above and standard deviation is below.

Delco: GED Class (cont.)

PROCESSES	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Total process responses	3.333 1.175	5.133 2.1	1.8 1.821	p<.001
Focus responses	1.533 .915	1.6 .737	.067 .594	n.s.
Strategy responses	1.667 1.047	1.133 .743	- .533 1.125	p<.05
Topic responses	.133 .352	2.4 2.261	2.267 2.187	p<.001
Article question (easy factual)	.933 .258	.867 .352	- .067 .258	n.s.
Article question (harder factual)	1.467 .516	1.267 .594	- .2 .676	n.s.
Graph question (easy factual)	3.8 1.082	3.933 .594	.133 1.187	n.s.
Graph question (easy factual)	3.4 1.183	3.467 .64	.067 1.223	n.s.
Graph question (harder factual)	3.133 1.407	2.667 1.496	- .467 1.356	n.s.
Graph question (inference)	1.6 1.454	2.067 1.1	.467 1.598	n.s.
Job aid question (easy factual)	.533 .516	.467 .516	- .067 .594	n.s.
Job aid question (harder factual)	2.4 .828	2.867 .352	.467 .915	p<.05
Job aid question (inference)	2.667 .724	2.4 1.121	- .267 1.438	n.s.
Cloze test score	7.467 1.642	7.933 2.187	.467 2.232	n.s.

* In each pair of values, mean is above and standard deviation is below.

Delco: ESL Class (n = 15)

BELIEFS & PLANS	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Literacy self-rating	3.091 .302	3.455 .522	.364 .505	n.s.
Change in literacy self-image	*(Holistic*		0.067 .799	n.s.
Change in plans for 1 year	*judgements*		0.2 .775	n.s.
Change in plans for 5 years	*of change: no pre-*		0.2 .676	n.s.
Change in plans for 10 years	*and post-*		0.067 .704	n.s.
Change in plans for education	*scores)*		0.533 .64	p<.005
PRACTICES				
Reading/writing away from work	4.8 1.897	4.6 1.805	- .2 2.077	n.s.
Reading/writing at work	1.867 1.506	2.6 1.682	.733 1.624	n.s.
Items read (in 20 item list)	16.286 3.539	19.143 1.657	2.857 3.009	p<.005
Frequency of reading activities	15.6 4.205	16.333 4.624	.733 1.907	n.s.
Ownership of reading materials	4.462 2.295	4.923 2.326	.462 1.506	n.s.
Self-rating on talking in meetings	2.333 1.175	2.6 1.242	.267 .799	n.s.
Self-rating on ideas discussed	2.5 1.401	2.571 1.016	.071 1.141	n.s.
Self-rating on asking for help	1.267 .594	1.933 1.033	.667 1.234	p<.05

* In each pair of values, mean is above and standard deviation is below.

Delco: ESL Class (cont.)

PROCESSES	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Total process responses	3.533 .99	5.0 1.414	1.467 1.356	p<.0005
Focus responses	1.733 .884	1.667 .724	- .067 .961	n.s.
Strategy responses	1.533 1.125	1.667 1.047	.133 1.685	n.s.
Topic responses	.267 .594	1.667 1.543	1.4 1.765	p<.005
Article question (easy factual)	.867 .352	.867 .352	0.0 .378	n.s.
Article question (harder factual)	.8 .676	1.333 .617	.533 .99	p<.05
Graph question (easy factual)	3.733 1.1	3.733 1.1	0.0 1.363	n.s.
Graph question (easy factual)	3.0 1.195	3.467 1.125	.467 1.642	n.s.
Graph question (harder factual)	2.4 1.844	3.4 1.183	1.0 1.813	p<.05
Graph question (inference)	1.733 1.335	2.333 1.345	.6 1.454	n.s.
Job aid question (easy factual)	.667 .488	.733 .458	.067 .458	n.s.
Job aid question (harder factual)	2.2 1.014	2.533 .99	.333 .9	n.s.
Job aid question (inference)	1.6 1.352	2.533 1.06	.933 1.163	p<.005
Cloze test score	6.467 2.615	7.0 3.229	.533 2.642	n.s.

* In each pair of values, mean is above and standard deviation is below.

Cumberland: Communications and Collaboration Class (n = 21)

PRACTICES	Pre-test mean/s.d.*	Post-test mean/s.d.	Change mean/s.d.	Significance
Self-rating on talking in meetings	3.2 1.424	2.933 1.335	- .267 1.033	n.s.
Self-rating on ideas discussed	3.0 1.464	3.333 1.345	.333 1.397	n.s.
Self-rating on asking for help	1.214 .579	1.643 1.008	.429 .646	p<.05
SUPERVISOR RATINGS				
Communication	2.762 .944	5.048 1.024	2.286 .644	p<.0001
Concerns, problem-solving	2.667 .796	4.857 1.014	2.19 .928	p<.0001
Handling conflict	3.0 1.049	5.143 1.315	2.143 1.236	p<.0001
Self-esteem	2.905 .944	5.333 1.39	2.429 1.076	p<.0001
Setting goals	2.857 .727	4.857 1.315	2.0 1.225	p<.0001
Commitment	3.143 1.276	4.857 1.315	1.714 1.007	p<.0001
Responsibility	3.19 1.169	5.19 1.327	2.0 1.095	p<.0001
Initiative	3.143 1.195	4.714 1.347	1.571 .811	p<.0001
Paper work	2.429 .87	4.714 1.707	2.286 1.309	p<.0001
Machine setting	3.238 1.179	5.095 1.546	1.857 1.276	p<.0001

* In each pair of values, mean is above and standard deviation is below.